FISCAL YEAR 1992 EPA RESEARCH AND DEVELOPMENT BUDGET

HEARING

BEFORE THE

SUBCOMMITTEE ON ENVIRONMENT

OF THE

COMMITTEE ON

SCIENCE, SPACE, AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

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*Ranking Republican Member.

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FISCAL YEAR 1992 EPA RESEARCH AND DEVELOPMENT BUDGET

TUESDAY, MARCH 12, 1991

House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Environment,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room 2325, Rayburn House Office Building, Hon. Howard Wolpe (Acting Chairman of the Subcommittee) presiding.

Mr. Wolpe. The Committee will come to order. I welcome our witnesses and guests of this budget authorization hearing for EPA's Office of Research and Development.

Last year, EPA's research budgets increased by only two percent over fiscal year 1990 levels. This year's increase in the budget is only 13 percent. Is this cause for celebration or a mere sigh of relief?

I should indicate for the record that Congressman Scheuer is attending a funeral in New York today. That is why I am occupying the chair at this point and we will be having a rotating chairmanship during the course of this hearing.

If we take a look at the graph that is being put up now, we are able to see that the EPA R&D budget has in fact not yet recovered in dollars adjusted for inflation from the devastating cuts of the Reagan years.

In fact, last year, in real dollars, we suffered a setback. The newly enacted environmental legislation, of laws such as the Clean Water Act and the Superfund over the past decade, have increased significantly the responsibilities of EPA. Yet, at the same time, the R&D budget declined dramatically and has not yet recovered.

What is a reasonable amount of money to spend on research activities at the EPA? In September of 1988, the Science Advisory Board, in its report entitled "Future Risk: Research Strategies for the 1990s," concluded that the EPA's R&D budget needed to be doubled between 1990 and 1995.

In recommending this doubling, the SAB stated that the increase, "May seem extravagant, especially in light of the current Federal budget deficit and strong public pressure to balance the Federal budget. However, the nation invests approximately $70 billion per year in pollution control, and that figure is increasing. We should be willing to invest at least one percent of that amount to achieve the kind of health, environmental and economic benefits that have resulted from past R&D efforts."

We can see, by looking at the next graph, that this sound advice is falling on deaf ears. The Science Advisory Board budget recommendation is made equal to 100 percent in each of the years 1990, 1991, and 1992. The second bar represents the EPA budget request to OMB. The third bar is the President's request to Congress for these years.

The budget prepared under former Administrator Lee Thomas managed a request to OMB that was larger than the SAB's recommendation in 1990. Each of the past two budget requests, both from the EPA and the President, have fallen far short. In fact, this year's budget request from the President for fiscal year 1992 is 26 percent less than the SAB recommendation. We are continuing to lose ground.

No matter how much money we spend on research, our results are limited by the quality of the scientific equipment and the adequacy of the laboratories we have available. In the picture that is now being shown, we see that EPA laboratories are not operating optimally.

In the top picture, we see the damage caused by a roof that has been leaking at EPA's Research Triangle Park, North Carolina Labs for the past three years or so. Does this seem like a reasonable way to treat expensive scientific instrumentation? Is it a new technique for attracting research scientists who are fond of camping in the great outdoors?

I didn't write this; I am just reading the script.

An area that we also plan to address in this hearing is the adequacy of funding for programs in which members of the subcommittee have worked assiduously. These include indoor air quality research, cross media pollution prevention, and funding of extramural grants.

While regulatory issues like Superfund and the Clean Air Act attract a lot of media attention, the fact is that science is the backbone of effective environmental protection. If we don't have the technology to clean up a toxic waste site, all the Superfund money in the world isn't going to clean it up. EPA's research and development budget is an essential investment in the knowledge we need to fight pollution.

Through enhanced research, we will not only continue to identify and address new environmental problems, but we will be better armed to prevent environmental problems through wise management. Wise management must include setting priorities for addressing environmental risk in a way that gives us the biggest bang for our limited buck.

Today's witnesses will testify on the EPA Science Advisory Board's September 1990 report on risk reduction and how EPA's budget reflects the recommendations of this excellent report. We look forward to receiving their testimony.

Our witnesses to start off this morning's hearing will include first Mr. Erich Bretthauer, the Assistant Administrator of the Office of Research and Development of the EPA. Accompanying him will be his deputy, Dr. John Skinner.

Following Mr. Bretthauer's testimony will be Dr. Bernard Goldstein, a former EPA assistant administrator for ORD, who is now at the University of Medicine and Dentistry of New Jersey. He must catch a plane, and therefore, we are going to be asking that he follow Mr. Bretthauer this morning.

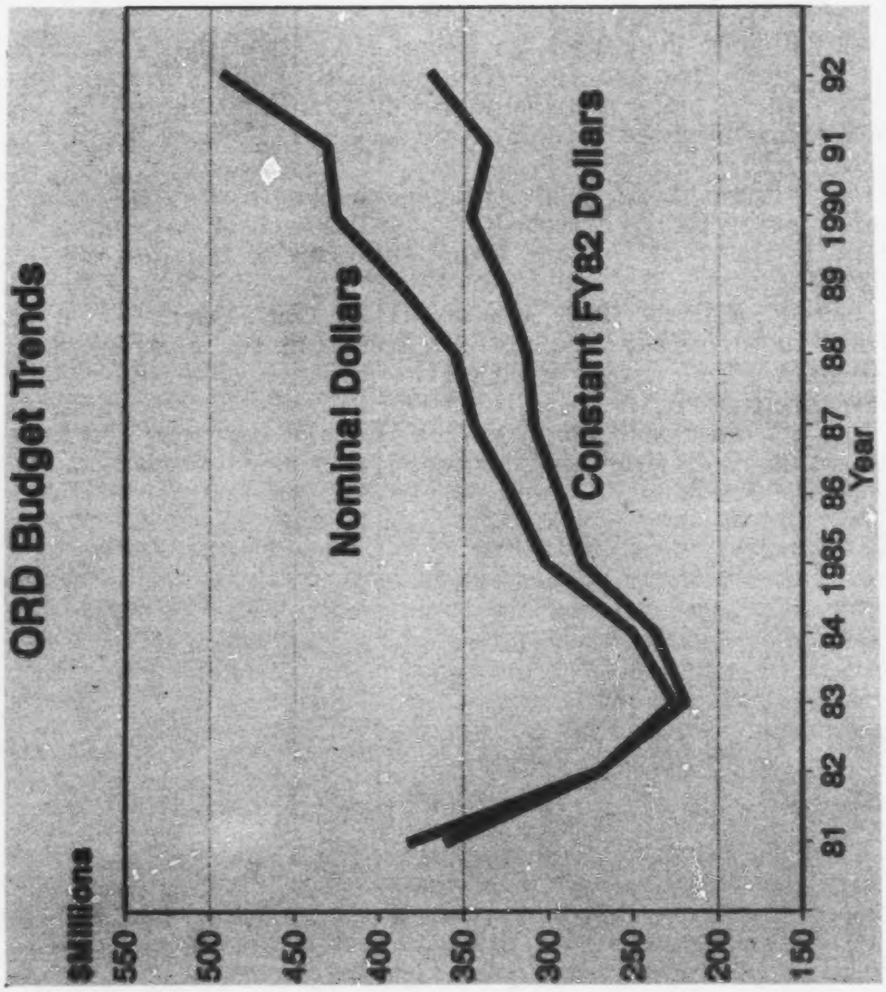
We will then hear from Dr. Robert Huggett of the EPA Science and Advisory Board and the Virginia Institute of Marine Sciences in Seaford, Virginia; and Dr. John Neuhold, Chairman of the ORD budget subcommittee of the EPA Science and Advisory Board, from Logan, Utah.

We welcome you, Mr. Bretthauer, this morning. We would, of course, enter into the record your entire written testimony. We would invite you to offer a verbal summary of that testimony at this point.

I should indicate that, as soon as Mr. Ritter arrives, we will invite him at the conclusion of your testimony to make his opening statement.

Mr. Bretthauer.

[The aformentioned graph for the Office of Research and Development at the Environmental Protection Agency follows:]


ORD Budget Trends
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Nominal Dollars
Constant FY82 Dollars

STATEMENT OF ERICH W. BRETTHAUER, ASSISTANT ADMINISTRATOR, OFFICE OF RESEARCH AND DEVELOPMENT, U.S. ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY JOHN SKINNER, DEPUTY ASSISTANT ADMINISTRATOR FOR RESEARCH AND DEVELOPMENT

Mr. **Bretthauer**. Thank you, Mr. Chairman. I have about a six minute brief statement of my testimony, which you indicated would be in the permanent record of this hearing, that I would like to provide now.

Research is one of the primary tools for reducing environmental risks. Without a substantial investment in research and development, we cannot understand the processes and practices that cause pollution, the means by which it is transported and changed in the environment, the mechanisms of human exposure and the exposure of ecological resources, the kinds of risks that pollutants pose or the way in which society can best prevent, reduce or eliminate these risks.

The EPA's fiscal year 1992 budget proposes to spend $491.4 million and 1,934.1 work years. This is a $58.8 million and a 43 work year increase above fiscal year 1991 levels.

I shall return to specific budget initiatives in a moment, but first, I would like to briefly give you an overview of some of the new forces and directions that are playing a significant role in EPA, and the way in which science and research can affect the influence of these new directions. Finally, I will discuss the importance of environmental research in achieving the nation's environmental goals.

During the past few years, William Reilly, EPA Administrator, has set out to change the way EPA thinks, plans and implements its programs by fostering strategic planning, by focussing on pollution prevention, by working to involve the academic community and the industrial community much more closely in our programs, by focussing on cross media issues, by including other Federal agencies in our programs to multiply our joint effectiveness, and by directing our efforts to the largest risk to people and our ecosystems. These new efforts have had a profound effect on the Agency.

EPA's research program is also changing. Many of the forces that I mentioned above are affecting EPA's Office of Research and Development, as well as the other offices in the agency.

Change has been underway at the ORD for several years now. We are indeed a very different organization today than we were just three short years ago.

In 1989, the EPA Science Advisory Board published a landmark report suggesting major changes in our program. Foremost among their many recommendations was that we establish a core program to look at fundamental scientific and technological issues of importance to environmental quality.

We have since implemented the SAB's recommendations and are well on the way to a more balanced and comprehensive research program. As part of the overall effort introduced by the Administrator, ORD has prepared a strategic research plan that we will use to guide our program. The process of strategic planning has proved to be very valuable, and will in the future direct our research agenda.

There are a number of themes that come out of our strategic plan that I would like to highlight for you. First, insuring that our research programs reflect the highest risk areas.

Second, placing greater emphasis on ecological research and ecological risk assessment.

Third, aggressively evaluating innovative approaches to risk reduction, both for pollution prevention and pollution control, that offer order of magnitude improvements over current practices.

Fourth, improving methods for assessment of health and ecological risk with a special focus on comparative risk recommendations of the SAB report, reducing risks.

Fifth, establishing a strong program of technology transfer; and

Sixth, establishing productive working relationships with other Federal agencies, industry, academia, and other countries to help leverage our resources and take advantage of outside expertise.

I believe that EPA must expand its position as a science agency in addition to being a regulatory agency. My vision is that ORD should become a premier science organization where high quality science is focused on priority environmental problems where we can make an even more significant contribution to the improvement of environmental quality.

A recent report of the SAB on reducing risk identified several environmental problems as relatively high risk based on available scientific data and technical understanding. In terms of ecological risk, the problems of habitat alteration, loss of biological diversity, stratospheric ozone depletion and global climate change ranked as highest priorities.

Four areas were highlighted as most significant in terms of human health impacts: ambient air pollutants, worker exposure to chemicals in industry and in agriculture, indoor air pollution, and pollutants in drinking water.

The ORD research budget proposed for fiscal year 1992 responds to both the high risk problems identified by the SAB and to the environmental policy shifts that are now underway. Overall, our proposal addresses several inter-related objectives. We continue to build our core research program, address cross media environmental problems such as agriculture and lead in an integrated fashion, and improve our science advisory responsibilities in the Agency to ensure that the best science is brought to bear on key environmental problems.

In addition, we are moving toward a new planning process that will define EPA's research program around a set of risk based issues. This problem solving orientation will, I hope, add coherence to our programs and ensure that research remains focussed on the highest priority problem.

Let me take a couple minutes and give you some highlights in our budget request for fiscal year 1992. The recent amendments to the Clean Air Act are a milestone in environmental policy that will ensure cleaner air for all Americans.

The Agency's fiscal year 1992 budget request directs 30 additional work years and more than $20 million toward implementation of the Clean Air amendments. We have planned an ambitious set of activities to support the implementation of these amendments, which includes refinement of models for ozone nonattainment; development of emission inventories needed to help states prepare State Implementation Plans; evaluation of the continuous emission monitors for sulfur dioxide, which will be crucial to a successful market based emission allowance program; evaluation of the benefits of the Clean Air Act amendments' implementation by tracking improvements in the environment; and additional research on the health effects of ozone at subchronic and chronic exposures.

The protection of ecological resources is emerging as one of the nation's and EPA's high priorities. The alteration and destruction of habitat, and related problems of species extinction and overall loss of biological diversity, as well as global climate change were identified by the EPA Science Advisory Board as high risk ecological problems that should be given increased attention.

Our fiscal year 1992 budget research request responds to these priorities by targeting two large valuable ecosystems for special studies; by improving our ability to monitor and assess the quality of ecological resources through expansion of our Environmental Monitoring and Assessment Program; and by increasing research efforts on wetlands and global climate change.

Planning for our Ecological Monitoring Assessment Program has been underway for several years. The program approach is gaining acceptance from the scientific community. Broad scientific peer reviews have been conducted by the National Academy of Sciences, EPA's Science Advisory Board, the American Statistical Association, and by the Estuarine Research Federation [sic].

We also have a large number of Federal agencies participating in the program, including NOAA and the U.S. Forest Service and the U.S. Department of Agriculture.

Expansion of the global climate research program is also proposed for fiscal year 1992. Emissions of carbon dioxide, methane and other greenhouse gases are altering the chemistry of the atmosphere, and threatening to change the earth's climate. There is considerable debate and uncertainty about the extent of and consequences posed by climate change, but there is agreement on the need for better understanding of the cause and effect relationship between harmful emissions and climate change.

The Federal Coordinating Council on Science and Technology, which is referred to as FCCSET has prepared an interagency budget proposal for fiscal year 1992 on global climate change research. The total EPA research program requests $26 million for fiscal year 1992.

Sound environmental decisions depend on understanding human health risks from diverse environmental contaminants, including air pollutants, pesticides and other toxic chemicals, waste, drinking water contamination and radiation. Surprisingly little is known about how humans are actually exposed to pollutants.

In line with the recommendations of the Agency's Science Advisory Board, we are proposing to expand exposure assessment research by $3 million in fiscal year 1992. In addition to this fundamental work to improve the methods for predicting actual human exposures, we plan to emphasize lead, which remains as a significant public health problem and indoor air pollutants such as biocontaminants, environmental tobacco smoke, and volatile organic compounds associated with large buildings.

Finally, we plan to initiate research to determine the potential health risks from electromagnetic radiation fields.

The costs of cleaning up and disposing of pollutants after they have been generated can be enormous, as is painfully clear from EPA's Superfund program. In general, the preferred solution is to stop pollution at its sources, and this is indeed the focus of our pollution prevention research program. By substituting less toxic substances, recycling, screening new chemicals before they are introduced into the environment, we can go a long way towards minimizing pollution.

Our 1992 budget request will fund new research initiatives on source reduction and product recycling. One of ORD's greatest contributions to the pollution prevention effort is technology transfer. So creating new and extensive databases is, of course, a high priority.

One of the most promising and exciting areas of research is the development of innovative techniques to combat environmental problems such as oil spills and hazardous waste sites. EPA is committed to this goal. A major focus of our research is the area of bioremediation. We saw firsthand the potential of bioremediation as an effective tool in cleaning up the oil spill in Prince William Sound. Bioremediation has also been used successfully for remediating hazardous waste sites.

Despite these successes, there is a lack of understanding on the specific principles involved. In fiscal year 1992, we are proposing an expansion of our work in this area to improve our base of scientific knowledge, particularly as it applies to optimizing the application of in situ bioremediation.

The last area that I want to discuss is the foundation of a successful research program, high quality scientists and engineers, adequate facilities, and modern equipment. In the fiscal year 1991 appropriation, we were given the authority to use R&D funds for some of our laboratory operating expenses. Our fiscal year 1992 budget adds about $4 million to address the most urgent equipment needs.

New equipment, however, is only part of the problem. No resource is more essential to successful research than the scientists and engineers who do the work. That is precisely why the President's budget focusses on nurturing young talent that will contribute considerably to tomorrow's research efforts. EPA will join in an inter-agency initiative, coordinated under FCCSET that will provide financial support to undergraduate and graduate students in math and science.

One of the greatest sources for scientists and engineers lies in the under-represented minority population. The proposed budget provides an addition of $1 million to fund minority fellowships and traineeships that support graduate students in environmental sciences at minority academic institutions.

In sum, Mr. Chairman, I believe that EPA is headed in new and exciting directions that will allow it to be more successful and effective in protecting environmental quality.

That concludes my prepared summary.

[The prepared statement of Mr. Bretthauer follows:]

STATEMENT OF
ERICH W. BRETTHAUER
ASSISTANT ADMINISTRATOR
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON ENVIRONMENT
COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

MARCH 12, 1991

Mr. Chairman and members of the Subcommittee:

I am pleased to have the opportunity to testify before you on the proposed research program for the U.S. Environmental Protection Agency (EPA) in Fiscal Year 1992.

Dr. Allan Bromley, Director of the President's Office of Science and Technology Policy, testified before the Science, Space, and Technology Committee last month about the special emphasis that research and development is receiving in the President's proposed Fiscal Year 1992 budget. He described a range of benefits that result from a strong program of research and development with which I wholeheartedly agree.

He pointed out that:

- research is an investment in fostering economic growth and improving the quality of our lives;
- research can help us deal with pressing national needs, such as global change, to better understand the functioning of the earth's system on a global scale;
- research can help us explore intellectual and physical frontiers, not from the perspective of economic and social returns, but as part of the quest for scientific understanding; and finally

- research carries with it the very critical ancillary benefit to our society of strengthening mathematics and science education.

Research is one of the primary tools for reducing environmental risks. Without a substantial investment in research and development, we cannot understand the processes and practices that cause pollution, the means by which it is transported and changed in the environment, the mechanisms of human exposure and the exposure of ecological resources, the kinds of risks that pollutants pose, or the way by which society can best prevent, reduce or eliminate those risks.

The EPA Fiscal Year 1992 budget proposes to spend $491.4 million and 1934.1 workyears. This is $58.8 million and 43 workyears above Fiscal Year 1991 levels.

I shall return to specific budget initiatives in a moment. But first, I would like to briefly give you an overview of some new forces and directions that are playing a significant role in EPA, and the way in which science and research can affect and influence these new directions. Finally, I will discuss the importance of environmental research in achieving the Nation's environmental goals.

New Directions at EPA

Shifts in Environmental Program Approaches

During the past few years William Reilly, the EPA Administrator, has set out to change the way in which the EPA thinks, plans and implements its programs by fostering strategic planning, by focusing on pollution prevention, by working to involve the academic community and the industrial community much more closely in our programs, by focusing on cross-media issues, by including other Federal agencies in our programs to multiply our joint effectiveness, and by directing our efforts to the largest risks to people and ecosystems. These new efforts have had a profound impact on the Agency.

A Strategy for Research

EPA's research program is also changing. Many of the forces I mentioned above are affecting the EPA Office of Research and Development (ORD) as well as the others in the Agency. But, change has been underway at ORD for several years now. We are a very different organization today than what we were just a short three years ago. In 1989, the EPA Science Advisory Board (SAB) published a landmark report suggesting major changes in our program. Foremost among their many recommendations was that we establish a core program to look at fundamental scientific and technological issues of importance to environmental quality. We have since implemented the SAB's recommendations, and are well on the way to a more balanced and comprehensive research program.

As part of the overall effort introduced by the Administrator, ORD has prepared a strategic research plan that we will use to guide our program. The process of strategic planning has proven to be very valuable, and will in the future, direct our research agenda. There are a number of themes that come out of our strategic plan that I would like to highlight for you:

- ensuring that our research programs reflect the highest risk areas;
- placing greater emphasis on ecological research and ecological risk assessment;
- aggressively evaluating innovative approaches to risk reduction, both for pollution prevention and pollution control, that offer "order-of-magnitude" improvements over current practices;
- improving methods for assessment of health and ecological risks, with a special focus on the comparative risk recommendations of the SAB report "Reducing Risk: Setting Priorities and Strategies for Environmental Protection;"

- establishing a strong program of technology transfer; and
- establishing productive working relationships with other Federal agencies, industry, academia, and other countries, to help leverage our resources and take advantage of outside expertise.

I believe that EPA must expand its position as a science agency in addition to being a regulatory agency. My vision is that ORD should be a premier science organization, where high-quality science is focused on priority environmental problems, and where we can make an even more significant contribution to the improvement of environmental quality.

New Directions in ORD

The recent report of the SAB on reducing risk identified several environmental problems as relatively high risks, based on available scientific data and technical understanding. In terms of ecological risks, the problems of habitat alteration, loss of biological diversity, stratospheric ozone depletion, and global climate change ranked as the highest priorities. Four areas were highlighted as the most significant in terms of human health impacts: ambient air pollutants, worker exposure to chemicals in industry and agriculture, indoor air pollution, and pollutants in drinking water.

The EPA/ORD research budget proposal for Fiscal Year 1992, responds both to the high-risk problems identified by the SAB and to the environmental policy shifts that are underway. Overall, the proposal addresses several interrelated objectives -- we continue to build our "core research" program; address cross-media environmental problems, such as agriculture and lead in an integrated fashion; and, improve our science-advisor responsibilities in the Agency to ensure that the best science is brought to bear on key environmental problems. In addition, we are moving toward a new planning process that will define EPA's research program around a set of risk-based issues. This problem-solving orientation will, I hope, add coherence to our programs and ensure that research remains focused on the highest priority problems.

Highlights of the budget are provided below, followed by a more detailed summary of the entire budget.

Highlights of the Budget

Ambient Air Pollution

The recent amendments to the Clean Air Act are a milestone in environmental policy that will ensure cleaner air for all Americans. The provisions of the new law, which deal with air toxics, acid rain, stratospheric ozone, pollutants from mobile sources, and attainment of standards for ozone, carbon monoxide, and particulate matter, pose significant challenges for research. The Agency's Fiscal Year 1992 budget request directs 30 additional workyears and more than $20 million toward implementation of the Clean Air Act Amendments.

We have planned an ambitious set of activities to support implementation of the Clean Air Act Amendments, which includes refinement of models for ozone nonattainment; development of emission inventories needed to help states prepare State Implementation Plans; evaluation of continuous emission monitors for sulfur dioxide, which will be crucial to a successful market-based emission allowance program; evaluation of the benefits of the Clean Air Act Amendments' implementation by tracking improvements in the environment, and additional research on the health effects of ozone at subchronic and chronic exposures.

We are striving to conduct a comprehensive program that balances both support for program implementation and the need for more fundamental research with longer term payoff. During the reauthorization process, considerable attention was given to crafting a new research title, which mandates a broad spectrum of research on monitoring and modeling methods, ecological impacts of air pollution, health effects associated with exposure to many air pollutants, and continued improvement of technology for control (and prevention) of air pollution.

We have worked closely with the EPA Office of Air and Radiation on setting priorities for research and technical support. The pressing nature of many of the specific requirements of the new air law necessitates substantial near-term support at the expense of longer term research. We hope that over time we will be able to bring a better balance among these competing needs.

Ecological Risks

The protection of ecological resources is emerging as one of the Nation's and EPA's highest priorities. The alteration and destruction of habitat, the related problems of species extinction and overall loss of biological diversity, as well as global climate change were identified by the EPA Science Advisory Board as high-risk ecological problems that should be given increased attention. Our Fiscal Year 1992 research budget request responds to these priorities -- by targeting two large valuable ecosystems for special studies (the Great Lakes and the Arctic ecosystem); by improving our ability to monitor and assess the quality of ecological resources through expansion of the Environmental Monitoring and Assessment Program (EMAP); and by increasing research efforts on wetlands and global climate change.

One of our largest and most valuable ecosystems, and one with significant problems, is the Great Lakes. As part of an Agency-wide initiative on the Great Lakes ecosystem involving the Water Program and the regional offices, an increase of more than $5 million of research is requested to assess the significance of contaminated sediments, evaluate the adverse ecological effects of the Zebra Mussel, and develop a mass-balance model for Lake Ontario. Our budget request also seeks new funding for an initiative on Arctic ecosystems, which, as part of a multi-national effort, will evaluate the effects of atmospheric contaminants on the Arctic .

The Agency's budget will also continue to emphasize EMAP, our long-term "core research" effort designed to monitor and assess the condition of the Nation's ecological resources. EMAP will enable us to evaluate the success of current environmental policies and programs, and identify emerging problem before they become widespread or irreversible.

Planning for EMAP has been underway for several years and the program approach is gaining acceptance from the scientific community. Broad scientific peer reviews have been conducted -- by the National Academy of Sciences, EPA's SAB, the American Statistical Association, and the Estuarine Research Foundation. We have a large number of Federal agencies participating in the program, including the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Forest Service, and have sparked considerable international interest (e.g., Australia is using the monitoring system design for arid lands, Canada is using EMAP design indicators for one of its own monitoring plans, and Romania is using an EMAP grid for a Danube delta lakes survey.)

The EMAP program began field work only last year. We are testing the approach in the hardwood forests of New England, near-coastal estuaries in the Northeast, and in coastal pine forests in Virginia and will then scale-up to other systems. To continue our efforts this summer, we will conduct an estuarine demonstration project along the Gulf Coast, a surface water pilot involving a regional lake project in the Northeast, and a pilot study on coastal salt marshes in Louisiana.

In Fiscal Year 1992, we will continue to expand these initial efforts and add several ecosystems including the Great Lakes, arid lands, and agro-ecosystems. Additionally, data exchange with other Federal agencies on air and deposition issues will be a priority. We will also be gearing up the integration and assessment element of EMAP, a critical component that will interpret ecosystem data in the larger landscape and regional contexts.

Expansion of global climate research is also proposed for Fiscal Year 1992. Emissions of carbon dioxide, methane and other greenhouse gases are altering the chemistry of the atmosphere, and threatening to change the earth's climate. There is considerable debate and uncertainty about the extent of and consequences posed by climate change, but there is agreement on the need for better understanding of the cause-effect relationships between harmful emissions and climate change. The Federal Coordination Council on Science and Technology (FCCSET) has prepared an interagency budget proposal for Fiscal Year 1992 on global climate -- the total EPA research program request is $26 million for Fiscal Year 1992.

The increase will provide additional process-based information regarding the terrestrial biosphere in support of the negotiations for a Global Forestry Agreement, as well as additional studies in tropospheric chemistry to further define the lifetimes and global warming potentials of greenhouse gases, data which will be used in integrated modeling efforts for assessments.

The ORD Global Change Research Program is designed to define the role of the terrestrial biosphere in the global climate issue. The program will provide an understanding of the sources and sinks of carbon within forested ecosystems and soils, and how climate affects those resources, as well as the feedbacks from the terrestrial biosphere as they affect climate change. In addition, ORD will quantify the anthropogenic and biogenic sources of carbon dioxide and methane, and determine the fate of the greenhouse gases in the atmosphere. This information will provide policy-makers with the basis for options and recommendations to reduce greenhouse gas sources and the scientific basis for increasing sinks, as well as provide information that can be used to determine the feasibility and environmental impacts of physical and biological management.

We will also be expanding our wetland research program, in support of the Administration's "no-net-loss" goal. This research will provide the methodologies needed to assess water quality functions of wetlands, assess cumulative impacts of wetland conversion, and evaluate techniques for mitigating wetland impacts.

Human Health Risks

Sound environmental decisions depend on understanding human health risks from diverse environmental contaminants, including air pollutants, pesticides and other toxic chemicals, wastes, drinking water contaminants and radiation. Surprisingly little is known about how humans are actually exposed to pollutants, and in line with recommendations of the Agency's Science Advisory Board, we are proposing to expand exposure assessment research by $3 million in Fiscal Year 1992. In addition to this fundamental work to improve the methods for predicting actual human exposures, we plan to emphasize lead, which remains as a significant public health problem, and indoor air pollutants such as biocontaminants, environmental tobacco smoke, and volatile organic compounds associated with large buildings. And finally, we plan to initiate research to determine the potential health risks from electromagnetic radiation fields.

Pollution Prevention

The costs of cleaning up and disposing of pollutants after they have been generated can be enormous, as is painfully clear from EPA's Superfund program. In general, the preferred solution is to stop pollution at its source, and this is the focus of the pollution prevention research program. By substituting less toxic substances, recycling, and screening new chemicals before they are introduced into the environment, we can go a long way toward the goal of minimizing pollution. Our 1992 budget request will fund new research initiatives on source reduction and product recycling. One of ORD's greatest contributions to the pollution prevention effort is technology transfer, so creating new and more extensive data bases is a high priority.

Innovative Technologies

One of the most promising and exciting areas of research is the development of innovative techniques to combat environmental problems such as oil spills and hazardous waste sites. EPA is committed to this goal. A major focus of our research in this area has been bioremediation. We all saw first-hand the potential of bioremediation as an effective tool in cleaning up the oil spill in Prince William Sound. Bioremediation has also been used successfully for remediating hazardous waste sites. Despite these successes, there is a lack of understanding of the scientific principles involved. In Fiscal Year 1992, we are proposing an expansion of our work in this area to improve our base of scientific knowledge, particularly as it applies to optimizing the application of in situ bioremediation.

Infrastructure

The last area that I want to discuss in detail is the foundation of a successful research organization -- high-quality scientists and engineers, adequate facilities, and modern equipment. In the Fiscal Year 1991 appropriation, we were given the authority to use R&D funds for some of our laboratory operating expenses. Although in 1991 we had to absorb this expense by reducing planned research, we believe this gives ORD the ability to operate and manage a much more effective research program. However, addressing our infrastructure shortcomings will require additional funding in later years to replace more fully the equipment currently used by our scientists that is obsolete and beyond its useful life. Our Fiscal Year 1992 budget adds almost $4 million to address the most urgent equipment needs.

New equipment, however, is only part of the solution. No resource is more essential to successful research than the scientists and engineers who do the work. That is precisely why the President's budget focuses on nurturing the young talent today that will contribute considerably to our efforts tomorrow. The EPA will join in an interagency initiative coordinated by FCCSET that will provide financial support to undergraduate and graduate students in math and science.

One of the greatest sources of scientists and engineers lies in our underrepresented minority population. The proposed budget provides an additional $1 million to fund minority fellowships and traineeships that support graduate students in environmental sciences at minority academic institutions. This program increases EPA's contact with minority science and technical students and develops a pool of highly qualified future recruits. ORD also relies on a special-emphasis hiring program to recruit from underrepresented groups. This program, in addition to facilitating recruitment of the most highly qualified personnel, helps our goal of maintaining a balanced workforce that closely resembles the American population.

Budget Summary

Now that you have heard some of the goals and issues that will drive our research efforts, I would like to describe in more detail our Fiscal Year 1992 research budget request. As you know, EPA is organized by environmental media, such as air, water, toxic substances, and waste. Research is performed in 12 laboratories across the country, by institutions of higher learning, and by numerous public and private organizations.

The President is proposing to increase research in air quality to more than $112 million in Fiscal Year 1992, an increase of almost $26 million. A major portion of this increase will fund the implementation of last year's Clean Air Act Amendments, key legislation needed to help mitigate threats to the nation's health and environment from air pollution. Additional funds will also enhance research in indoor air and global climate change. Our proposal includes $4 million for radiation research, which includes new research in electromagnetic fields. Our energy research request is $13.7 million. Research conducted in this area will support Clean Air Act implementation.

The Agency's proposed water quality research budget increases by $943 thousand to $28.7 million in Fiscal Year 1992. Increased resources are being requested for research toward mitigating the problems of the Great Lakes. We also propose to expand research in support of the Administration's wetlands "no net loss" goal, which is developing ecological indicators, methods for assessing value and function, and water quality management methods.

The request for research for drinking water is $22.2 million in the President's Fiscal Year 1992 budget. This reflects an increase of $1.5 million above the current Fiscal Year 1991 estimate. Increased resources will be used to expand MASTER, which studies the effect of agricultural chemicals on our nation's ground water. This is an interagency research effort with U.S. Department of Agriculture and the U.S. Geological Survey, and the new research efforts will help improve our understanding of conditions in which agrochemicals move through ground and surface water. This in turn will facilitate the development of guidelines, models, and decision aids to protect water quality. Increased funding is also being requested that will facilitate the protection of water wellheads from contamination by providing technical information to local wellhead managers.

The goal of the pesticides research program is to improve our understanding of how pesticides interact with human activities and the environment, to assure that their use minimizes damage from pests, while maximizing the protection of people's food, health, and the environment.

The proposed pesticides research budget of almost $15 million reflects an increase of $2.4 million. These increased resources will fund important research initiatives in neurotoxicology, reproductive toxicology, exposure assessment, and ecological risk assessment.

The President's Fiscal Year 1992 toxic substances research budget of $26.3 million will continue to focus on reducing risks to human health from exposure to toxic chemicals. The budget request reflects an increase of $783 thousand and will fund research initiatives in neurotoxicology, ecological risk assessment, and exposure assessment.

The budget request for hazardous waste research is $43.4 million, an increase of slightly more than $4.2 million. Additional resources will fund a coordinated research effort in the area of bioremediation. Expanded research initiatives will also focus on RCRA correction action, municipal solid waste, and human health risk assessment.

Research for Leaking Underground Storage Tanks (LUST) remains unchanged at $768 thousand. Technical support is provided to Federal, State and local agencies implementing the LUST Trust Fund Program to help insure the best available site assessment and cleanup procedures.

Research for Superfund is proposed to decrease by almost $5 million to $68.6 million. Increased site-specific support will be provided to the Regions and States to assist them in carrying out emergency response and cleanup activities. Increased support will also be provided to demonstrate and evaluate innovative monitoring technologies in a cooperative program with the private sector to determine the applicability of the technology for Superfund site assessment and pollution characterization. These increases are offset by project completions and terminations.

The President's proposed research budget for the multimedia portion of our research program is $151.1 million, an increase of almost $28 million. A considerable portion of this increase is for urgent infrastructure needs, including the replacement of obsolete scientific instrumentation necessary for our scientists and engineers to pursue successful research. Significant increases are also requested to expand the Agency's Environmental Monitoring and Assessment Program. The multimedia

Mr. Wolpe. Thank you very much, Mr. Bretthauer.

I would like now to yield to our distinguished ranking member of the committee and Mr. Ritter for his opening statement.

Mr. Ritter. Thank you, Mr. Chairman. I want to welcome our distinguished witnesses.

Last fall, the EPA's independent Science Advisory Board issued a report, "Reducing Risk: Setting Priorities and Strategies for Environmental Protection." The key recommendation of that report is that the EPA should set priorities to address the worst environmental risk first. That kind of makes common sense, but it hasn't been exactly the way we have done business around here.

I have worked throughout my Congressional career to interject a greater degree of science into the way we handle the problems of environmental hazards. The environment benefits if we commit our resources to tackle activities which pose—or situations which pose—the most serious threats to the environment.

So, I am heartened that the Administrator, William Reilly, is responding to the Science Advisory Board's report, and attempting to move the EPA in the direction of "worst first" regulation of environmental hazards.

The Office of Research and Development is the cornerstone of that effort. A strong R&D effort can help separate the most important problems from less pressing or perhaps more popular concerns.

Quite frankly, the Agency's record in using good science to formulate good regulatory policy isn't as strong as it could be and as it should be. That is perhaps where we come in. The current situation is a lot like the glass which is half full or half empty, depending on how you look at it. There seems to be an increasing trend and desire at the EPA to focus on the most serious problems, to use their resources in the wisest way they know how, but the bulk of EPA's R&D agenda is, of course, dictated by the mandates of our major environmental statutes.

The science of risk assessment continues to advance, but consistency in its interpretation and application is not yet a reality. This year's budget figures reflect healthy increases in R&D funding, given fiscal pressures. As the Chairman points out, however, the Science Advisory Board's goal of doubling the R&D budget—that was in Chairman Scheuer's remarks—within five years continues to slip away.

So, I hope our distinguished witnesses will shed some light on the directions which they believe EPA ought to take to move further toward a "worst first" scheme of regulating environmental risks. I welcome our witnesses, and look forward to their input.

I am going to excuse myself for having to be in another hearing at the exact same time. So, I will be shuttling back and forth in another hearing where I am the Ranking Member, and we are introducing another piece of legislation today. This issue is extremely important to me, Mr. Chairman. I yield back.

Mr. Wolpe. Thank you, Mr. Ritter.

Mr. Bretthauer, one of my particular areas of interest is that of pollution prevention. I would like to focus for a couple of moments on that part of the EPA's Office of Research Development budget. In the tier that I have seen, under the pollution prevention category, you cite a 9.4 1991 enacted budget and a requested increase of $1.4 million in pollution prevention. But as we have looked at the internal analysis of that contemplated increase, it appears to be all for risk reduction research.

Now unless we are defining everything in the world to be pollution prevention to make pollution prevention figures look better, I don't understand why we are considering the risk reduction research in the pollution prevention category.

Mr. BRETTHAUER. I am going to, with your permission, Mr. Chairman, I am going to pass that question to my deputy, Dr. Skinner who heads our pollution prevention activities in the Office of Research and Development.

Dr. Skinner.

Dr. SKINNER. Mr. Chairman, I would be happy to look at your analysis and try and explain the numbers to you, but our definition of pollution prevention is with respect to recycling and source reduction only. These increases will be used for those purposes. They will not be used for broad risk reduction and broad pollution control.

Mr. WOLPE. That is not what we were told at the staff level briefing by your Agency.

Dr. SKINNER. We could go over that with you, but most of the work in this area is going to be for recycling, product redesign, life cycle of products, process changes.

Mr. WOLPE. Let me give you a chart that was supplied to us by EPA, outlining the fiscal year 1992 changes for multimedia R&D. You will see in there the $1.4 million increase, which is characterized explicitly for risk reduction.

Dr. SKINNER. I am not sure why that number is titled that way. I do know that the increase in the pollution prevention multi-media is for recycling and source reduction.

Mr. WOLPE. You understand the basis of our concern here, obviously, because we have had a long standing preoccupation with trying to get more than lip service as it is directed at pollution prevention activities within the EPA budget. We spend about $100 billion each year on pollution control agency-wide. Agency-wide, the EPA spends about $25 million on pollution prevention initiatives. The ratio is some 400 to 1.

I guess I would be interested in your evaluation as to whether that is a rational way to spend our environmental protection dollars.

Mr. BRETTHAUER. My own view, Mr. Chairman, is that we need to move toward pollution prevention as a cornerstone of the Agency's environmental strategy. I am not sure that your assessment is the same as our understanding of the $1.4 million here. We would be pleased to get back, but as Dr. Skinner indicated, I believe that his assessment in terms of the recycling and life cycle analysis is correct. We would be pleased to get back with you.

Mr. WOLPE. I would appreciate that. Last year, the appropriation's process regrettably resulted in the cut of some $24 million for planned research. When that cut came down from the Congress and EPA set about to identify where I was going to take the reductions, the principal reductions occurred in the areas of pollution prevention, indoor air research, extramural grants, which raised some issues for us at least in terms of the priority setting process at EPA. It appeared that emerging research areas were being discriminated against while funding in the more traditional established areas was being preserved. Can you assure us that these essential areas supported by this subcommittee and the Science Advisory Board will not suffer this fate again if indeed there are further reductions that are imposed for whatever reasons?

Mr. **Bretthauer**. Well, I believe your assessment that research grants were cut at our request after the Congressional passback was incorrect. The Congress cut our principal investigator and initiated grants program by some $7 million. We initiated no additional cuts, to my knowledge, from that proposal. The grants program remains a very strong commitment from this individual certainly.

Mr. **Wolpe**. My understanding is that there was an additional $400,000 that the EPA did cut in that area. Again, would you—that's another issue that you can check at the staff level after this hearing.

Pollution prevention and indoor air, what is the explanation for those reductions?

Mr. **Bretthauer**. There was a minor cut in indoor air. It certainly doesn't reflect, Mr. Chairman, our overall concern about indoor air. It is, as I recall, an area where we could delay a project that we were performing under indoor air without any long term effects. What we were trying to do in these cuts—they were unanticipated—what we were trying to do is provide the least long term negative effect of our whole research program. So sometimes projects that were just being initiated could be delayed slightly, provide less of a negative impact over the long period of time than others.

As I pointed out, it was unanticipated for Congress to do that. What we tried to do is minimize the overall effect. It doesn't mean that indoor air was less of a problem for us. It means that some project that was destined to start at a certain time could be delayed for a short period of time without any long term adverse effect.

Mr. **Wolpe**. I would only have to note, though, that the amounts involved represented a third or more of the total funding for indoor air research. To suggest that this was a relatively minor mention of the program, I think is a bit off target.

Mr. **Bretthauer**. Dr. Skinner pointed out that our indoor air increased from fiscal year 1990 to 1991 by——

Dr. **Skinner**. From $3.8 million total to $4.3 million total. We did not—our request was much higher than that, and when we received the $25 million cut from the Congress, we had to reduce our increase between——

Mr. **Bretthauer**. So it didn't reduce the program, Mr. Chairman, it just reduced what we had hoped to—what our Congressional request was. The actual program still continued to grow.

Mr. **Wolpe**. I want to go back briefly to one comment you made. When you said the Agency defines pollution prevention as source reduction and recycling and that the $1.4 million you were talking about earlier would go to those two areas, I want to underscore the Congressional definition of pollution prevention as source reduction only. I hope that it is not the Agency's intention to begin to blur that distinction by adding recycling, even though recycling is admittedly in and of itself important. It would diminish the emphasis we are attempting to place on source reduction activities.

Dr. SKINNER. Yes. When I said recycling, I did not mean off-site recycling; I meant recycling in the production process itself. It is very closely related to actual production of waste.

Mr. WOLPE. Good. My last question. The SAB has outlined a program which spends some $26 million over five years to update equipment and facilities. That is how much they would spend. EPA's budget allocates $7.5 million in fiscal year 1992 for this purpose. At that rate, it would take some 15-20 years to update the equipment.

Isn't it necessary to move somewhat more rapidly than this rate would suggest?

Mr. BRETTHAUER. Congressman, I would certainly like to move more rapidly. I would like to update all of our equipment instantaneously if I could. It is simply a matter of priorities. When working with budget constraints, we have to provide our—propose our money in the way that we think best meets our overall objective. But in the long term, we need to update approximately $80 million worth of equipment in the Office of Research and Development.

There is just one item I just—some information that I have been given with respect to the grants. We did not cut our grants program. In the category of grants, we delayed the state of Center, one of our research centers. We delayed the awarding of Center, which was in the same budget category. So we did not cut any of the grants program as I had originally indicated.

Mr. WOLPE. Thank you very much. At this point, I am going to relinquish the chair to Mr. Swett with my apologies that I cannot remain at this point. Thank you very much, Mr. Bretthauer.

Mr. SWETT [assuming chair]. Good morning. I appreciate the opportunity to chair for this next half hour this subcommittee in examining the EPA funding for 1992.

I would like to take this opportunity first to welcome you, Mr. Bretthauer and Dr. Skinner. I look forward to hearing your answers to a few questions that I have. I also want to take this opportunity to welcome my colleague, Congresswoman Morella. I appreciate your attending this morning, and I look forward to your participation in this fine hearing this morning as well.

Before I get into any questions of my own, I would like to extend the courtesy to my good colleague, and allow her to bring herself up to speed with any questions that she might have of the panel and at this time, yield to that purpose.

Mrs. MORELLA. I thank the Chairman for doing that. It would keep me a long time to yield to the—up to snuff on responses to all of the questions that I may have or the knowledge I may need to gain from you.

I have an opening statement, and if I might ask unanimous consent that it be included in the record in its entirety.

Mr. SWETT. So granted.

[The prepared opening statement of Mrs. Morella follows:]

Constance Morella

OPENING STATEMENT
HEARING ON THE FY 1992 EPA RESEARCH AND DEVELOPMENT BUDGET
MARCH 12, 1991

MR. CHAIRMAN, I LOOK FORWARD TO HEARING FROM THE WITNESSES TODAY WHO WILL SUMMARIZE THE SCIENCE ADVISORY BOARD REPORT ON RISK REDUCTION AND THE EXTENT THE PROPOSED FISCAL YEAR 1992 OFFICE OF RESEARCH AND DEVELOPMENT BUDGET FITS WITH THE REPORT'S RECOMMENDATIONS.

I AM CONCERNED THAT THE BUDGET REQUEST OF $491.3 MILLION FOR FISCAL YEAR 1992, ALTHOUGH AN INCREASE OVER FY 1991 FUNDING, IS LOWER THAN RESEARCH AND DEVELOPMENT FUNDING WAS IN 1981, AND THE NEEDS ARE GREATER TEN YEARS LATER. IN THE ERA OF LIMITED FUNDING, THE EPA MUST SET PRIORITIES FOR "RISK REDUCTION" AND GET TO WORK ON THESE PROBLEMS.

AMONG THE PROBLEMS IS INDOOR AIR POLLUTION WHICH IS BECOMING A MAJOR PUBLIC HEALTH PROBLEM. YET THE BUDGET REQUEST DOES NOT REFLECT THE SERIOUSNESS OF THE PROBLEM. I SUPPORT EXPANSION AND STRENGTHENING OF RESEARCH IN INDOOR AIR CONTAMINANTS AND, THEREFORE, HOPE THE BUDGET WILL ADEQUATELY ADDRESS THIS ISSUE. I AND MANY OF MY COLLEAGUES HAVE HEARD FROM EPA EMPLOYEES AT THE WASHINGTON OFFICE ABOUT THE HEALTH PROBLEMS EXPERIENCED BY THE WORKERS THERE.

I THANK THE WITNESSES FOR THEIR TIME AND EXPERTISE. I HOPE WE CAN LEARN FROM THE SCIENCE ADVISORY BOARD'S RECOMMENDATIONS AND WORK TOGETHER ON ISSUES THAT AFFECT HUMAN WELFARE.

Mrs. **Morella**. I have gone through your testimony that you have presented, Mr. Bretthauer. I want to say that I have been concerned that the budget request for $491.3 million for fiscal year 1992, although it is an increase over 1991 funding, as you have mentioned, is lower than the research and development funding was in 1981, and the needs are certainly greater than they were 10 years ago.

In the era of limited funding, the EPA must set priorities for risk reduction and get to work on the problem. I have also been concerned with indoor air pollution, as Mr. Wolpe has mentioned. As a matter of fact, I was one of the signatories of the letter that he had sent on March 1st of this year, indicating concern about the proposed budget cuts for pollution prevention activities of the EPA office.

I have heard what you have said in response to some of his question about indoor air quality. It has consistently been identified by the Science Advisory Board and others as posing a serious threat to human health, and, yet, ORD is proposing to devote less than $7 million to indoor air quality research. It hardly seems to demonstrate a commitment.

In discussing the previous year's funding level, 1990, it was $3.8 million. In fiscal year 1991, after the cuts, it was $4.3 million. In fiscal year 1992, it is $6.8 million. Yet, if you look at amounts like $68 million on Superfund research, et cetera, it hardly seems to demonstrate a level of commitment. Yet, it is such an important problem and concern.

Would you like to comment on the overall aspect of it?

Mr. **Bretthauer**. Yes, I would. I would agree with you that indoor air is a very serious problem. Our understanding of indoor air with research that we are doing and with the research that others are doing continues to impress us that it is an important national problem.

Although the small—the numbers that you indicate, indicate it is a relatively small effort, I would point out that we added $2.5 million in the President's proposal for fiscal year 1992, which is a significant increase in the Agency program in that particular area.

I would also point out that a good deal of the research that is conducted in other programs is applicable to indoor air. For example, the health effects program that we do in respect to all of our pollutants are what are commonly termed outdoor pollutants is certainly applicable to indoor air.

I would just say that we are very committed. We have added almost a third to our budget for fiscal year 1992. I think that you can look forward to a commitment certainly from this office in terms of identifying and articulating and trying to advocate additional research in this area to be very pronounced. So I think you will see a lot more from us in future years.

Mrs. **Morella**. We certainly do hope so. Also, you kind of alluded to something. I wanted to pick up on that as yet, your multi-media project. I wonder if that is being utilized and coordinated as well as it could be and should be, and whether you have any plans to do so.

Mr. **Bretthauer**. Well, in our view, we have not done a good job in coordinating multi-media research, at least as well as we might in the past. As you may know, we are organized around media and EPA, air, water, hazardous waste, toxic pesticides.

It has been during the administration of William Reilly that there has been a very serious push to begin an effort to think about cross media, to look at the Great Lakes, the Chesapeake Bay and other scientific areas in terms of better addressing cross media impacts.

Indeed, our planning system for fiscal year 1992, changes we are proposing in our planning system will reflect that point of view as a better way to address cross media impacts.

Mrs. MORELLA. How would you, in light of that, get rid of the individual statutory mandates?

Mr. BRETTHAUER. That is a very tough question. I am certain our Administrator would like to address it with you. I can tell you generically that there is a commitment to work with the existing statutes in the Agency to address these cross media hazards better than we have. The only way to really address perhaps as effectively as you might and others might want to would be to replace the current legislative mandates with some generic legislation, allowing EPA to address its resources where the highest risks are targeted.

Mrs. MORELLA. Maybe that could be done in the budgetary planning process?

Mr. BRETTHAUER. I think it would be hard to do in the budgetary planning process, but it would be an entire revamping of the way that environmental protection is planned in this country. It would be a sweeping thing to consider.

Mrs. MORELLA. Maybe we should try that focus in terms of direction.

I am also personally glad that we took care of that infamous rug.

Mr. BRETTHAUER. The carpet in our headquarters.

Mrs. MORELLA. Yes, the EPA building. I have many constituents who were working there. Is it true that Senator Moynihan has recently announced that a new EPA building would be built?

Mr. BRETTHAUER. That is my understanding. On 14th and Pennsylvania, there is a new building that is currently under construction that will be the home of EPA, as well as some other agencies.

Mrs. MORELLA. It was rather ironic that EPA would have that kind of internal air quality hazard problem.

Well, I think you have got some good leadership at EPA. I certainly am impressed by the kind of dedication that I have seen. We look forward to hearing more from you, as you progress. I thank you, Mr. Bretthauer.

Mr. SWETT. Thank you very much. I'll take a few minutes to review some questions that I have, Mr. Bretthauer. Just by matter of bringing you up to date to—or up to speed, I guess is a better way of putting, as to my experience—I have had the unenviable position of actually directing toxic waste cleanup in numerous projects that I have been involved in.

My background as an architect and builder has exposed me, no pun intended, to certain risks and hazards of chemicals found in the soil. As an architect, I have been very involved in the quality of indoor air through the design and the manipulation of indoor air spaces, and whether they relate to computer room environments or working environments for people.

I have also more recently been involved in the alternative energy and cogeneration sector, which has a very strong tie to the environmental sector—what with the new legislation in the last decade, responding to nonattainment, attainment issues, and water quality issues and the like. The one thing that has been most interesting to me through my own experiences out in the real world, dealing with these issues is the lack of coordination between the EPA and industry in the extramural programs.

I have noticed, in looking through the budget as it is proposed, that, contrary to the feeling of the Administration that there are a thousand points of lights that ought to be used to illuminate certain aspects of this kind of partnership between government and the private sector, the program as delineated here actually calls for a decrease in funding which in my mind only points to a decline in the relationship between government and the private sector in coordinating this kind of research and development.

Could you please comment on that for me, please?

Mr. **Bretthauer**. I certainly could. I am very committed to working with the private sector, the outside organizations that you referred to. I am not sure exactly which budget figure you are talking about, but I can tell you that we have launched a major activity over the past couple of years to work more effectively with the private sector. For example, we are working now with the American Institute of Architects to develop a research base upon which they can provide standards.

Mr. **Swett**. Let me be more specific, if I may interject. The Centers and Grants Program is one such example of a program that has been cut from the extramural research grant program. This has cut the number of centers from eight to four. Can you describe the purpose behind that?

Mr. **Bretthauer**. I certainly can. That is a very important question that you brought up. We are committed to working effectively with the academic sector. We have proposed in the budget request for fiscal year 1991 a significant expansion in our grants program. The Congress reduced that program by $7 million.

The Centers program in which you refer to now, the cutting of centers from eight to four, simply refers not to a budget cut but to our strong conviction that the Centers funding per center was too low. As we are completing these centers, we are doubling the funding in each center and having a fewer number of centers, but we are not reducing the total number of dollars that go into those activities. We are trying to make them more viable. We are trying to make our relationship with the academic sector more viable overall. But it does not reflect a reduced commitment to working with them.

Mr. **Swett**. Last, I notice that not only do we have pictures of roofs with leaks and deplorable working conditions, moving from buildings that while we're out trying to evaluate the indoor air of other offices, cannot meet the indoor air quality of their own, we certainly are looking at an infrastructure problem that is going to, over the years, greatly impact the productivity of the Department.

Could you comment as to what kind of impact this will have and whether or not the $7.5 million that is attributed to rectifying that will adequately address the short term view to allow the EPA to continue function in an effective manner?

Mr. BRETTHAUER. I believe the $7.5 million moves to meet the most immediate problem so that we can work in a safe atmosphere, but I believe much more is necessary and we are going to work as hard as we can in future budgets to recognize that very important need. It is not an unrecognized need, Congressman. It is one that we are totally committed to. It is simply a matter of trade-offs in the budget that we provided to the Congress. You are going to see us working very hard to do a facilities plan for each of our facilities, including both short and long term needs so that we can more effectively articulate our position in the budget planning process both within the Agency and within the Administration. I am convinced that when we come before this committee next year, you will see additional emphasis in that important area.

Mr. SWETT. In conclusion to my questions, I have just come to recognize not only in the EPA, but in the government in general a particular problem with the roller coaster budgeting process that certainly the EPA has experienced over the last decade. It raises questions of inappropriate or inconsistent management practices. Certainly, the inconsistency among programs itself makes it very difficult for these programs to gather any kind of momentum as they begin to get into the meat of their particular area.

I see a general lack in long term planning, which concerns me greatly. Not only lack in long term planning as it relates to working with the private sector and encouraging this kind of partnership to take place, but also as it relates to the philosophy that if this preventative research and development were to take place up front, it would ultimately mitigate the cleanup actions that individuals like myself have had to participate in in the past.

I would encourage the EPA, and I concur with my colleague, Congresswoman Morella, that there is a good and caring and compassionate head at the EPA in William Reilly. I have met with him on many occasions. I respect his abilities. My real concern is that the Administration is not going to allow him to fully implement the quality and the kind of programs that are necessary in order for this kind of preventative medicine and this kind of preventative research and development to take place. That is a message that I give to you to carry back. I hope that that is something that we can accomplish through more properly structuring financial resources and directing those resources into areas that are going to be most effective. I think you are on the right track. I am not convinced that you have accomplished the end result yet. I think there is going to be a lot of tinkering to go on here. I am most interested personally in seeing management procedures, as you spoke, over the coming years as to how these programs will be implemented and not what their cost is. To me, we spend too much time talking about costs and not evaluating nearly enough the kind of management that will employ either efficient or inefficient utilization of these monies. That is a concern that I have. At this time, I would like to recognize a good friend of mine and colleague in the freshman class, Congressman Dick Zimmer. I would like to ask him if he has any questions or comments, opening statements that you would like to make before the first panel before we move on to what I believe to be one of your constituents who will be speaking on the second panel?

Mr. ZIMMER. Thank you very much, Mr. Chairman. In view of the fact that I think my constituent has to catch a plane, I will defer.

Mr. SWETT. That is a wise decision. At this time, I would like to thank this panel, Mr. Bretthauer and Dr. Skinner for your contributions. If possible, please remain for any further questions that might arise that you might so be advised to comment on. I would ask that Dr. Bernard Goldstein come to the table and be prepared to offer testimony.

STATEMENT OF DR. BERNARD D. GOLDSTEIN, M.D., DIRECTOR, ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCE INSTITUTE

Dr. GOLDSTEIN. Thank you, Mr. Chairman, Congressman Zimmer. I appreciate the opportunity to abridge my comments, paraphrase them if I may and submit the written testimony. I also appreciate your helping me with my schedule. When I left EPA, my major reason to do so was to teach, and I do have some teaching obligations this afternoon.

Let me start by echoing your comment about the process and the need to be sure that implementation actually occurs. The EPA SAB report that people have referred to frequently this morning was one that had recommendations as to budget and it had recommendations as to research, but it also had recommendations as to process within the Agency and developing the research.

I think in looking over what had been done over the past few years and by Mr. Bretthauer, I think they are to be highly commended for having developed a much more effective process in relating the research needs to the actual activities of the Agency in a way that should be much more fruitful in terms of providing the answer to questions that the Agency is addressing.

One of the most important things that the Agency is doing now is the worst first approach, which is this aiming at trying to get rid of those pollutants which have the biggest problems. It certainly is long overdue, but there is also a potential problem with that approach, which I think is necessary to bring forward to you, particularly when you are considering the research and development budget. The problem has to do with the fact that it really doesn't lead to the best of prevention naturally.

When we talk about prevention, we talk about primary prevention which is aimed at making sure that pollutant never gets out there, and making sure no one ever smokes a cigarette; the secondary prevention, which is dealing with the issue once it has already started to develop but before someone is really hurt by it, and the tertiary prevention which is after the fact—let's see if we can make things not as bad as they might be otherwise.

When you start with a risk assessment process that says what is the dirtiest out there and what is having the most impact on us, you are really doing secondary prevention. You are really focussing on those things, which are already dirty. I think that in the long run, what EPA has been most successful in is in the primary prevention. That gets less attention, but the primary prevention is making sure that the problem never developed in the first place.

To do that, you have to understand the basis for how chemical or physical agents interact with humans, with ecosystems, with biological processes. That basic understanding comes from research. It comes from the type of research that so often is called exploratory or long term. If we focus solely on what is already dirty, and do not provide enough support for the basic research to allow us to understand and prevent in the primary sense, then we will not really be doing a good pollution prevention job. We will not really be reducing all of the risk. Now it is much harder to quantify those things that never happened, but still, that is where our major input has been through the years, and I think where we have the most to be thankful for.

If I may, a few comments on some of the specific items in the budget. The scientific instrumentation budget is one that is still inadequate. EPA needs to improve its scientific methods by getting the newer instrumentation. We have really had a revolution in recent years in the type of scientific instruments that are available. Not only are they effective in terms of allowing us to do better science, they are also cost effective. It is amazing how cost effective these new devices are. We can do many, many things that we couldn't do before and much more cheaply than we could do it before. For EPA not to replace its outmoded equipment is something that hurts us in terms of dollars and cents, as well as hurt us in terms of science.

The indoor air pollution issue has been raised. The increase in funding for indoor air pollution research is highly welcome. It is long overdue, and it is still grossly inadequate. There is no question in my mind that in the United States today, indoor air pollution poses more of a health threat than outdoor air pollution.

This also presents a greater research challenge. There is a multiplicity of sources. There are all sorts of possibilities of synergistic interactions. There is a very close relationship between the human individual and the pollutant that is released. There is a wide range of concentrations that occur during the day when people are exposed, so that you have a situation in which extrapolating from the usual risk database is even more difficult. We really need more emphasis in this area.

You have heard much about the exploratory research program. Our failure to support that adequately has been a great loss to the nation's approach of really being able to deal with environmental health risks. We have one of the strongest, if not the strongest, academic research programs in the world in the United States. We simply haven't enlisted these people who are very interested in the environment. We haven't enlisted them, though, into dealing with environmental issues, simply because we haven't had the funding. Perhaps the best way for me to describe that is to say that as someone who directs a large environmental research facility at an academic institution—for many years, I told my faculty not to bother to even send a grant to the exploratory research program. It simply wasn't worth the time and effort of a good scientist to write a grant. That changed a few years ago, but unfortunately in the past year, with the cutback—and it is a Congressionally mandated cutback, as I understand it, from last year's budget, we again have the situation of many scientists sending in grants and only to be told that they won't even have the grant considered because there is no funding. Now that is a way to make sure that the academic scientific community simply won't respond again.

You have over 80—I understand over 80 universities have applied for these four Centers of Excellence. That shows the interest out there in universities in doing this type of research. We sincerely hope that those four Centers of Excellence will get funded because if they are not, I can assure you that you will not get a similar response in the future if the academic community is asked.

I don't want to stop on a negative point because I think that there are a lot of good things in this budget. But as always, when time is short, one focuses on the negative.

Thank you for the opportunity.

[The prepared statement of Dr. Goldstein follows:]

March 8, 1991

TESTIMONY

for the

Committee on Science, Space, and Technology

Subcommittee on Environment

March 12, 1991

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General Statement

EPA deserves to be highly commended for its Research and Development budget proposal. During the past few years there has been evidence of an increasing effectiveness of ORD's budget planning process. This improvement appears to have occurred through a better focus on the uncertainties that are crucial for decision-making. An overall agency approach toward planning, in which environmental problems presenting the highest risks receive the greatest amount of resources, is also becoming evident in the research and development budget process. In my opinion, this "worst first" approach is greatly desired, although as discussed below, does lead to one major drawback. Unfortunately, deficiencies still persist in the funding of exploratory research as well as in a number of other areas.

More importantly, the overall EPA R&D budget is still far too small for the task in hand. American corporations have been heavily criticized in recent years for their failure to invest sufficient resources in R&D, a failure that has led to inefficiencies that have greatly affected the ability of our corporations to compete internationally. It is instructive to realize that this dangerously low level of US R&D is about 7% of total budget as compared to 10-12% for Japan, Germany and other advanced nations. Contrast this with EPA's R&D budget which is less than 3% of the overall total. No responsible corporation would enter into major multibillion dollar activities such as Superfund, RCRA, the Clean Air Act, etc without investing heavily in R&D to determine the most cost efficient way to address these challenges. US industry has also been severely criticized for not taking a sufficient long-term view in terms of investment into new ideas or approaches that will be of value beyond the next year or two, particularly if the industry plans to be in the same market area in the future. However, it is not imaginable that the most backward major US corporation with as broad a "market area" as EPA would not be investing a much greater amount of funds than does EPA in developing and exploring new ideas that in the long run will be highly cost effective. EPA clearly can not believe that there is some magic nearterm date at which environmental issues will all be solved and disappear. Its failure to provide sufficient funding for R&D in general, and for longterm research in particular, is shortchanging the US public.

Specific issues are described below.

Pollution Prevention and Risk Reduction

As I stated previously, while EPA is to be highly commended for taking a planning approach based upon pollution prevention, the assumption that pollution prevention is equivalent to risk reduction as calculated by EPA is not completely correct. In public health we usually speak of three modes of prevention: primary prevention, the most effective, consists of actions which prevent the problem or threat from ever developing; secondary prevention deals with this threat in its early stages and, in the field of environmental health, often consists of cleaning up existing pollutant levels; while tertiary prevention in essence deals with the treatment of the adverse effect once it has occurred. Focussing on reducing the risks that are measured through the risk assessment process is a form of secondary prevention. Establishment of priorities for pollution prevention is performed through a quantitative risk assessment which depends upon correctly interpreting the potential adverse impacts of pollutants whose presence is already quantifiable. While it is important to appropriately establish priorities among the various existing problems which require mitigation and cleanup, it is even more important to be able to prevent future problems of potentially even greater magnitude.

In my view, the most important contribution of EPA has been the prevention of what has not happened at all. Our understanding of the basic mechanisms of actions of chemical and physical agents and biological systems has permitted us to develop tests which now greatly, but not totally, reduce the likelihood that new chemical or physical agents will be released that result in adverse effects ranging from deformed babies to dead fish.

Scientific Instrumentation

Of note is the increase in the budget request for scientific instrumentation. This is long overdue. As a general rule, the revolution in scientific instrumentation has lead to the newer models being far more cost effective, as well as being far more sensitive as scientific instruments, than older models. As indicated by EPA's Scientific Advisory Board, replacement of the outmoded scientific equipment in EPA's laboratories will not only improve the caliber of science but can be cost saving to the public in the long run. I suggest that the committee ask for testimony as to whether there is a sufficient increase in the budget for scientific instrumentation, in particular as the amount of funding requested does not reach the goals established by SAB. ORD should be asked for a long range plan to replace existing scientific instrumentation.

Exposure Assessment

The emphasis on exposure assessment is welcome. A recently released National Academy of Sciences document (Human Exposure Assessment for Airborne Pollutants: Advances and Opportunities; NAS, 1991) is a milestone in our understanding of the field of exposure assessment. Also of note is the formation just this year of an international society in the field reflecting the rapid scientific development of this new discipline. Exposure Assessment is of importance for two major reasons. Firstly, it is that part of the risk assessment process that is now most susceptible to a rapid increase in understanding, thereby leading to improved quantitative risk assessment. Secondly, understanding the pathways of exposure for humans or for susceptible ecosystems permits us to interdict the exposure thereby preventing the adverse effects. I anticipate that you will see further increases in the exposure assessment budget in coming years, and that these increases will be more than justified by the results.

Global Climate

The increase in budget for the global climate issue is highly necessary. In my judgment, this budget shows that EPA has finally recognized what its major role should be in the integrated governmental approach to this very important issue. There is no longer much of a question as to whether or not there will be global warming, and even the question of how much, how soon, has become susceptible to reasonable estimations. What is needed is more of an emphasis on "so what". EPA must rapidly move to address this issue, particularly as it relates to ecosystems that will be important to human existence. The research outlined in the present budget proposal provides a much needed jump start for EPA's activities in this area.

Epidemiology

The request of only $125,000 for studies in relation to the potential health effects of electromagnetic fields is inadequate. In part it reflects EPA's inability to develop an epidemiology program which would contribute to its understanding of the potential health effects of EMF or of other environmental agents. EPA needs a strong epidemiology program for a variety of reasons. Its absence puts EPA in the position of a carpenter who goes to work without a chisel. Not every carpenter's job requires a chisel, but by not having this important basic tool the carpenter will eventually find himself limited in his ability to do what is naturally considered to be the function of a carpenter. This is true for the lack of epidemiology at EPA.

This is not all EPA's fault, a major root cause is the lack of trained epidemiologists who would be capable of fulfilling this function, a point which has been made clear by the inability of EPA's R&D program to recruit good outside epidemiologists since the time that I was at the Agency six years ago. Substantial support of research in environmental epidemiology is needed.

Indoor Air Pollution

The increase in funding for indoor air pollution research is highly welcome, long overdue, and still inadequate. All calculations clearly indicate greater overall risk from indoor air pollutants than from current ambient concentrations in the United States. Indoor air pollution also presents a great research challenge due to the multiplicity of sources, the possibility of synergistic interactions, the close relation between pollutant release and personal exposure, and the wide range of temporal variations in concentration levels which pose problems in extrapolating from the usual risk database, and in accurately estimating exposure. More emphasis on indoor air pollution research would clearly signal that the Agency is truly concerned with pollution prevention rather than simply on regulating.

Superfund

A major problem under the last Superfund act was the inability to perform research on hazardous waste sites due to the various legal entanglements. While the new superfund act provides some improvements, the rate at which the remarkable research advances obtained at EPA and at the NIEHS Superfund supported programs are being brought to the field has not been as impressive as one would like. There are many very positive advances coming out of these programs which need to be tested on the sites. There may be a need to further remove legal impediments thereby providing the research that is so necessary to solve this problem in a cost effective manner.

Intermedia Research

The Intermedia program is one of the most important aspects of the overall research and development budget. Again, EPA should be commended for its attention to this budget and for improving its process by which it determines its research and the actual research plan. However, much more remains to be done.

The value of the Intermedia process to EPA should be obvious, but unfortunately is often not recognized by the program offices. No program office likes to see their tenth priority go funded while their ninth priority is not. However, if the tenth priority is also a priority for other program offices, i.e. is an intermedia priority, it might deserve to receive a higher priority then an issue which is pertinent to only a single program office. For example, questions such as the effects of chemicals on fetal development are pertinent to every one of the program offices, but will often require integration across program office boundaries by ORD to achieve proper recognition of the overall value of this research to EPA. Increased funding of Intermedia projects would fit in very well with the pollution prevention approach.

Exploratory Research

Reviews of EPA's R&D program have repetitively pointed out the inadequate support of exploratory research. The problems facing the nation's environment are not about to disappear, no matter how much money is put into mitigation and cleanup. Further, about the only certain prediction one can make is that some new unforeseen environmental problem will arise in the next few years, either a current problem that is now unrecognized, or a new problem based upon changing technology or lifestyles. Without an adequate exploratory research program we are condemning ourselves to waiting for the environmental disaster to occur, for people to be made sick or die.

The United States has the strongest academic research base of any country in the world. It is unquestionable that academic researchers, like all of our population, are truly concerned with issues affecting the environment. It would be relatively easy for EPA to enlist the skills of these scientists. However, in essence, the opposite has occurred. Academic scientists have been taught that it is basically a waste of time to apply to EPA's Exploratory Research Program. The program is not only chronically underfunded, it has a history of having much of its funds removed during the year so that applications prepared in the belief that support might be available prove to have been a waste of time. Productive scientists have better things to do with their time than prepare grant requests that have little if any chance of being funded.

A test of EPA's ability to deliver on its promises to academic scientists will be whether it fully funds the four Centers it recently proposed. Over 80 academic institutions applied, at a cost of probably over 30 person-years in preparation time. This large number reflects the eagerness of academic scientists to participate in environmental research. The failure to fully fund this program will be a large signal to avoid EPA.

Last year EPA tried for a substantial increase in this funding but much of the increase was diverted by Congress into directed projects. I hope this will not occur this year. As a goal, I suggest that 10% of EPA's F&D budget into the Exploratory grants and centers program is a minimum target for a healthy and responsive research and development program.

Health Effects Institute

A particularly good example of the direct and indirect value of exploratory research is provided by the activities of the Health Effects Institute. I serve on the HEI Review Committee and have had the opportunity to review the excellent and highly relevant first class health research related to air pollutants performed through its funding mechanisms. As you know, HEI is currently being reviewed by a Committee of the National Academy of Sciences and I am sure will receive high marks for scientific productivity. However, I am most impressed by what might be considered to be an indirect effect of its activities. Through the mechanism of sustained support of peer reviewed research, highly relevant research concerning the health effects of air pollutants has been performed by many of the nation's leading academic health scientists, health scientists who would not have been involved in applying their skills to this area were it not for the presence of the Health Effects Institute. Further because of their participation in HEI research, these health scientists have themselves become informed about the crucial scientific uncertainties underlying regulatory decisionmaking and have begun to make contributions through HEI and other advisory panels to resolve these issues. HEI is thus an excellent example of the importance to this nation of enlisting the enormous strengths of our academic community to address environmental health problems.

Unfortunately, not only has EPA done a poor job through the years of using the exploratory grant mechanism due primarily to grossly inadequate funding, it is now underfunding the HEI. Instead of there being increased support for this mechanism which has clearly proved its value, level funding in the face of the inflation in the costs of scientific research has meant that HEI is funding perhaps 50% less research than when it started, despite getting many more good proposals. Inevitably, first rate scientists stop bothering to compete for a source of funds that has so little likelihood of success. An immediate doubling of the HEI budget used for investigator-initiated research is a minimum need, and would be highly cost-effective as it would be matched by industry funds.

[illegible]

Mr. **Swett**. Thank you very much for your testimony, Dr. Goldstein. I would like at this point in time to yield any questions that I might have to my good colleague, Mr. Zimmer. At this time, I will turn the microphone over to you, Dick.

Mr. **Zimmer**. Thank you very much, Mr. Chairman. I would like to welcome Dr. Goldstein to this panel. My experience in the past has been that we have been on the same level at the same table with each other, working on things like indoor air pollution. I am so proud that New Jersey was somehow able to lure you away from the EPA. You are a real asset to our state, but I am delighted that you are providing your experience and your insight to us at the Federal level.

You have discussed and commended the trend toward risk-based analyses, I think, properly pointing to the defects in the approach or the pitfalls. What I would like to know is, as a practical matter, as somebody who has actually been inside the EPA, how would you get from the current system, which is not by any remote description risk-based, to one where we are actually spending money based on where the potential danger is greatest? How do we get from here to there in practical administrative and budgetary steps?

Dr. **Goldstein**. One step that Mr. Bretthauer discussed in response to questions had to do with the intermedia approach. Quite clearly, the problems that occur occur across media. The Great Lakes was mentioned. Chesapeake Bay was mentioned. I would also point out that human beings are, of course, intermedia receptors in the jargon. We integrate the various media that we come across.

Until EPA is able to develop a process that better reflects the intermedia nature of the threat to the ecosystems and to humans, they are simply not going to be able to deal as best they can with the issues.

Mr. **Zimmer**. But, you mention in your prepared testimony that the program offices are concerned with their own statutory mandates, first. As a result, programs such as intermedia programs such as pollution prevention sort of get left at the end of the line.

Is there an organizational way? Is there a statutory way that we can push this emphasis more prominently in the priority?

Dr. **Goldstein**. You can, as Congress, direct that the intermedia research budget be increased. You can direct that it be put under the control of the research and development program.

Mr. **Zimmer**. Is that what you would advise?

Dr. **Goldstein**. Certainly. I think that the ability of research and development to look across the various needs is one that has not been taken sufficient advantage of. I think that inevitably a program office going through its priorities will rank something having to do solely with its program office higher than other issues.

The other issue, though, and I'll use the example in my written testimony of developmental toxicology. There are chemicals out there which may be affecting human development. Now there are chemicals in—these chemicals are in every medium. Developmental toxicology may be the tenth priority for every single one of the program offices. They are going to be upset if their ninth priority isn't funded while that is. But it is because it goes across all the program offices that it ought to be funded. Who could tell that?

Well, only those looking across the entire program office menu, if you will, of research needs. Quite clearly, that is the research and development people.

Mr. Zimmer. I appreciate that. On indoor air pollution, you commend the fact that the funding has been increased. Do you believe that it is targeted properly?

Dr. Goldstein. I looked at that. My feeling is that there are so many targets in indoor air pollution, that we are just barely scratching the surface. It is almost hard to do the wrong thing now. There are just so many things that need to be done. If we had about ten times more money into it, we could start looking and say "do we really need this?" Right now, almost any research you can do into air pollution, whether it be source, effects, or anywhere in between is important research because we know so little.

Mr. Swett. Speaking of how little we know, an area that was of concern to me in the New Jersey legislature is the radon contamination. There have been some studies and some newspaper reports about the relative risks of radon. What would you say is the state of our knowledge on the dangers of radon, and particularly whether the four picocurie standard is appropriate. What kind of work do we need to do epidemiologically or otherwise so we understand the magnitude of the risk?

Dr. Goldstein. Well, it is clear that we have not been able to project our understanding to the public. The public is responding to the uncertainties more than to the certainties. Quite clearly, since our job is to work with the public, we must be able to narrow down these uncertainties. There are many uncertainties. We relate the radon risk to uranium miners.

Well, there is dust in the uranium mine that contains the radon. The radon gets attached to these dust particles. Are these dust particles more breathable than the dust particles in our own home? Does it make a difference whether you have a carpet? Does it make a difference whether you have a tile floor or a dirt floor down in your basement in terms of the particles? And what difference would that make in terms of ventilation? We don't know these things.

Now that is research that could have been done and should have been done five years ago. It still hasn't been done. We focus too much on getting out the information which we need to do, but on the mechanics of this and not enough on the basic understanding of radon and its risk.

The epidemiology needs to be done. It is difficult epidemiology, but that doesn't mean it can't be done. It still can be done if we can adequately quantify the real radon exposure?

Mr. Swett. Is it being done now? Are these studies being designed even?

Dr. Goldstein. The answer is yes, but, unfortunately, very little of that is being supported by EPA. The studies that I am aware of that seems to approach this are coming out of the National Institute of Environmental Health Sciences.

EPA simply does not have the epidemiology skills that it needs to have, whether in this area or in the EMF area. My analogy that I use in my written comment is a carpenter who goes out without a chisel in his tool box. You don't always need a chisel on every job, but if you don't have that chisel in that tool box, some day you are going to need it, and you are missing a basic tool for a carpenter.

By missing epidemiology, EPA is lacking that basic tool of an Agency that is responsible for protecting us from the environmental risks.

Mr. ZIMMER. How could the ORD research committees incorporate risk assessment in the research planning process?

Dr. GOLDSTEIN. I think they have to, to a large extent. I haven't looked at what they are doing on a day to day basis this year, but certainly in the past, they have worked very hard to be able to focus on what the risks are in terms of risk assessment. I think that the risk assessment paradigm has been very helpful for the Agency in focussing on risks.

Still, the program offices will appropriately respond to Congressional interests, to other interests that have to do with what their statute says. If risk is not important to the statute makers, then it is not going to be important to the program office people in a research committee.

Mr. ZIMMER. How would you propose the ORD go about basing its budget planning on risk-based criteria?

Dr. GOLDSTEIN. I think they have done a pretty good job of that. I think Mr. Bretthauer—I saw his charge to the research committees from last year at least. I haven't seen it for this year. It certainly did focus on the assessment of risk reduction approaches.

Now that doesn't mean it gets converted into activities, when, in fact, you are sitting with people whose job it is to deal with one small area of the Clean Air Act, the Clean Water Act, and who are being beset by everybody to get that job done.

Mr. ZIMMER. Thank you very much. I would really appreciate maybe if you could propose some specific statutory initiatives you mentioned that we might be able to put into the basic law, to force these busy specialists to take into consideration some of these general concerns.

Dr. GOLDSTEIN. I appreciate the opportunity.

Mr. ZIMMER. Thank you. Thank you, Mr. Chairman.

Mr. KOPETSKI. Dr. Goldstein, welcome. I have a couple of questions. One, Congressmen and women, by definition, fly in airplanes a lot. I don't know where, but I learned that somewhere along the line, the airline industry changed the design of airplanes so that in order to increase fuel efficiency on an airplane, it is now a self contained unit in which we are actually breathing each other's air after an hour and a half or two hours essentially.

Apparently the incident rate of airlines having to land because they are not quite certain of communicable diseases, especially in international flights, has gone up a little bit because of this. But also it is sort of the same system or thought in a lot of our office buildings in this country. Sort of it is all internalized, and we are breathing each other's air.

It seems like on the indoor air pollution—I come from Oregon, and we have done a lot to indoor air pollution. I think we have struck a good balance in the cigarette issue and we focus on the radon issue somewhat.

What aren't we focussing on in terms of indoor air quality with respect to breathing what we are breathing? What do you think we should be doing?

Dr. **Goldstein**. Right now, we can measure literally hundreds of chemicals in the air of this room right now. Give me another decade, and I will make it thousands of chemicals not because the room will be any more polluted, but because our chemical analytical technique will be even better.

I don't know what difference that makes.

Mr. **Kopetski**. As long as we don't get sick, it doesn't matter?

Dr. **Goldstein**. Today, tomorrow, a year from now? Fifty years from now? I know there is Benzene in this room. I know Benzene can cause leukemia. I don't know whether the dose response curve for Benzene is such that at these low levels, they are definitely going to give us leukemia, but I do know that there is a risk and that I am going to hypothesize it is going to be there, because I do a risk assessment that assumes that at these low levels, the risk is there. But I don't know that.

I don't know what the metabolism is at these low levels. I could find that out, though. There is a research mode to do that. I don't know which metabolites of Benzene are responsible for causing the leukemia. If I knew that, then I could figure out whether or not at these low levels we are making these metabolites. So I could look at it at that point of view.

Also, I don't know—perhaps it is these lovely cushions on those chairs that you are against that are emitting some of these compounds. I know very little about that. I know very little about what difference it makes that you have got Benzene in this room, and you have also got 16 other compounds which may interact with it.

So there is so much I don't know, starting, as I say, with the sources themselves. I mean this cup, probably I could get something out of this cup that is in the air as well. There is water in the cup. I don't want to analyze your water for you, sir, but there may well be something that is off-gassing from that.

I don't know enough about the sources. I don't know what happens to the sources in the air. I don't know what happens when they get into the body. I don't know what the end point is of concern within the body.

Mr. **Kopetski**. Well, as we err on the side of caution on source control and closed environments?

Dr. **Goldstein**. Well, many of the sources that we are talking about have so many other trade-offs that if they are harmless—I mean this cup has a trade-off as opposed to a glass cup in terms of washing it versus discarding it. There are so many other things that get involved in it, that to simply say if there is anything coming off of this cup, let's make sure that we don't have it in the room. It is just, I think, a little bit too soon. We are dealing with life style preferences and uses of the American public. I think we have to know more than just saying no, don't admit it.

Mr. **Kopetski**. If we start studying these kinds of things, it takes time. There is this natural—it seems to me a natural tension conflict between the program people who, by nature, look at short term issues and research folks who look at these long term questions. Do you support the concept of a national environmental institute to insulate the basic R&D budget from more tempting short term program or even political needs?

Dr. GOLDSTEIN. I support the concept that we need more basic research in the area of ecology which, I think, where a lot of the people from the National Environmental Institute are going to. I do not support the concept that ORD should be separate from EPA. I think as a nation we did that experiment. At the same time that we developed EPA with ORD part of it, we developed OSHA and NIOSH as separate entities and separate cabinet offices. I think that if you looked over the past 20 years, my bias is that EPA has done a better job of getting out health based research pertinent to regulation than has the OSHA-NIOSH pair. I think that is partly because the EPA has ORD within its regulatory domain rather than something way off in another cabinet office and they need not pay any attention to each other.

Mr. KOPETSKI. Thank you very much for joining us today. We have a second panel, Dr. Robert Huggett, who is with the EPA Science Advisory Board, and Dr. John Neuhold, the Chairman of the ORD Budget Subcommittee.

Thank you and welcome.

STATEMENT OF DR. ROBERT HUGGETT, SCHOOL OF MARINE SCIENCE, THE COLLEGE OF WILLIAM AND MARY

Dr. HUGGETT. Thank you, Mr. Chairman. My name is Bob Huggett. I am a professor of Marine Science at The College of William and Mary. I head up a division called Chemistry and Toxicology at the College's Virginia Institute of Marine Science.

I currently serve as a member of the Executive Committee of the Environmental Protection Agency's Science Advisory Board. Today, I have the pleasure of discussing a report that has been mentioned numerous times this morning, "Reducing Risks: Setting Priorities and Strategies for Environmental Protection."

In 1978, the Congress mandated that EPA, under the Federal Advisory Committee Act, form a group of qualified and independent non-governmental scientists and engineers to provide advice to the administrator on the scientific and technical soundness of the Agency's rules and regulations. The SAB was formed. It currently consists of about 60 members and from time to time, up to 200 consultants and various committees are called.

In general, the SAB restricts its advice to technical and scientific issues. Seldom does it get into risk management or issues that border on policy. However, the subject of today's presentation or my presentation, "Reducing Risk," is an exception.

In contrast to the 1970s, today we have a much better understanding of our environment and the problems that we have in it. This allows us to make smarter, wiser decisions to deal with these remaining and emerging environmental issues. Increasingly, we recognize that we have limitations. We have limitations with our knowledge. We have limitations in our funding and resources. It is incumbent upon us, therefore, to work smarter by targeting those resources where they will do the most good.

It is important that we set priorities among the most legitimate and I stress legitimate, environmental needs, and to adopt strategies that will improve the environment for the next generation.

In 1986, the then administrator of EPA, Mr. Lee Thomas, asked 80 career EPA people to work together to identify and rank the most important remaining and emerging environmental problems. The result of that is a document called, "Unfinished Business." It was released in 1987.

When Mr. Reilly came to EPA, he felt that he could use this document to guide EPA's action. In the spring of 1989, he asked the Science Advisory Board to apply its technical and scientific expertise to critiquing the "Unfinished Business" report, and to suggest options for reducing some of the highest ranking environmental problem areas.

The Board accepted the invitation, and had a goal, which was to provide decision makers and the public with the best technical and scientific knowledge available on the relative risk posed by different environmental problems and the options to reduce those risks.

This project was overseen by a parent committee, the Relative Risk Reduction Strategies Committee. There were three subcommittees: one that focussed on human health; one on ecology and welfare; and one received the input from the other two and developed strategic options to address the issues.

We presented the report to Mr. Reilly in September of 1990. We had eight findings in the report. We noted that the "Unfinished Business" document was a bold and a much needed first step, but we found that there were major shortcomings in the databases and the methodologies available for assessing risk and in ranking risk and the potential for reducing these risks.

We found that the Agency had considered the protection of public health to be its primary mission, and that this was a major finding. It spent less concern about the risks posed to ecosystems. The Board found that this position was short-sighted, emphasizing that human health and welfare ultimately rely upon the life support systems and natural resources provided by healthy ecosystems.

In the admitted absence of definitive data to evaluate the comparative risks posed by different environmental problems, there were recommendations or we found that there were ways that we could get around some of them by looking at the number of people or organisms that were exposed to the risk and the likelihood of the environmental problem actually occurring, the severity of the effects, of the economic losses, and other damages.

In addition, the Board identified time—in other words, how long it would take for the system to recover—and the space: Are we talking about feedlots or are we talking about ecosystems or biomes. That is extremely important in assessing the risk.

We found that sometimes the most serious as thought by the general public, or those risks that they felt most important, were not necessarily those felt most important by the scientists. We did not feel that the public was necessarily wrong, but they were looking at it with a different set of objectives. We urge that the EPA listen carefully to the public's perception about risk in balancing its own program.

As you have already heard, the Ecology and Welfare Committee ranked as the highest risk problems habitat alteration and destruction, species extinction, overall loss of biological diversity, stratospheric ozone depletion and global climate change.

The Human Health Subcommittee ranked as relatively high risk the ambient air pollutants, worker exposure to chemicals in industry and agriculture, pollution indoors and pollutants in drinking water.

There were a number of other finding in our report, but they all came down to ten recommendations. We recommended that EPA target its environmental protection efforts on the basis of opportunities for the greatest risk reduction. We felt that EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk.

We felt that EPA should improve the data and analytical methodologies to support the assessment, comparison and reduction of different environmental risks; that it should reflect its risk based priorities in its strategic planning and budget processes; that EPA and the nation as a whole should make greater use of all the tools available to reduce risk, and as was previously mentioned, the EPA should emphasize pollution as a preferred option for reducing risk.

EPA, we felt, should increase its efforts to integrate its environmental considerations, considerations that it feels are important, into the broader aspect of public policy in a fundamental manner. For instance, in one of the ecological risks—the highest risk is habitat alteration, EPA cannot work in a vacuum without discussing its considerations with the Department of Agriculture, for instance.

The EPA should work to improve public understanding of the environmental risks and train a professional work force to help reduce them.

Finally, we recommended that EPA develop improved methods to value natural resources, to account for long term environmental effects in its economic analyses. We felt that for some things, willingness to pay does not properly value a resource.

With that, Mr. Chairman, I will close and thank you for this opportunity.

[The prepared statement of Dr. Huggett follows:]

THE TESTIMONY OF DR. ROBERT HUGGETT
House Committee on Science, Space and Technology
Subcommittee on the Environment
March 12, 1991

I. Introduction

My name is Dr. Robert Huggett. I am Professor in the School of Marine Science of The College of William and Mary. I am also an Assistant Director of the College's Virginia Institute of Marine Science where I head the Division of Chemistry and Toxicology. Over the past 23 years I have been involved in a number of environmental issues, including Kepone contamination of the James River in Virginia, tributyltin (TBT) in the coastal environment, and cancer in fish.

I currently serve as a member of the Executive Committee of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board (SAB). I am a member of the SAB's Ecological Processes and Effects Committee (EPEC). Other professional activities include membership on committees and panels of the National Academy of Sciences' National Research Council and advisor to the Commonwealth of Virginia on state of the Chesapeake Bay.

Today, I want to discuss one of the SAB's most important and far-ranging reports: Reducing Risk: Setting Priorities and Strategies for Environmental Protection (EPA publications #EPA-SAB-EC-90-021 and its three appendices #EPA-SAB-90-021A; -021B; and -021C [Exhibits 1-4]). My testimony will focus on the SAB organization, the events surrounding the preparation and release of Reducing Risk. I am pleased to be here before this House committee to provide an SAB perspective on these matters similar to that presented to a Senate committee last month.

II. The Science Advisory Board

In 1978 Congress mandated that EPA establish, under the Federal Advisory Committee Act (FACA), a group of highly qualified, independent (non-governmental) scientists and engineers to provide objective advice to the EPA Administrator on the scientific soundness of the technical and scientific basis for the Agency's rules and regulations. The SAB currently consists of 60 members, supplemented by over 200 consultants, who apply their technical talents to examining a wide range of scientific issues. The activities of the Board are coordinated by an Executive Committee, of which I am a Member. The members are distributed among eight permanent committees that conduct 50-60 meetings per year and produce roughly 30 reports each year.

In general, the SAB restricts its inquiries to the strictly technical and scientific issues surrounding environmental questions. Issues of "risk management", to use the language of the National Academy of Science (NRC, 1984), are generally beyond the scope of SAB activities.

In some instances, however, the Board is invited to examine an issue and to render its technical and scientific perspective on [illegible] matter under discussion. This has been true in two major SAB reports released during the past four years: 1) Future Risk:

A Research Strategy for the 1990s and 2) Reducing Risk: Setting Priorities and Strategies for Environmental Protection. It is the latter report that I want to address today.

III. Events leading up to Reducing Risk

A. Background

Twenty years after the founding of EPA, the U.S. finds itself confronted with a changed set of challenges. In contrast to 1970, we now have an increased base of knowledge about and experience with the environment and its problems. This base provides us with the information to make smarter choices about how to deal with the remaining and emerging environmental problems.

Thanks to aggressive action on the part of the public and private sectors, the environmental problems of today are significantly different from those we confronted two short decades ago. In place of belching smokestacks and rivers that catch fire, we must now address less photogenic problems that continue to linger (e.g., lead contamination) and that were unheard of in 1970 (e.g., the "ozone hole").

Increasingly, we recognize that there are limitations to the resources available to address these remaining and emerging problems. Therefore, it is incumbent upon us to "work smarter" by targeting those resources where they will do the most good; i.e., result in the greatest reduction of environmental risk. All of this must be done in a climate characterized by increasing public concern about environmental problems and increasing expectations that those problems should and will be eliminated. Rarely does the public make a distinction about the relative importance of environmental problems, preferring instead, action on all of the problems that exist. However, it is important to set priorities among legitimate environmental needs and to adopt strategies that will improve the environment in the most effective ways.

B. The request for the Reducing Risk project

It was in this climate of increasing demand and expectation that in 1986 the Administrator, Mr. Lee Thomas, asked 80 career people in the Agency to work together to identify the most important remaining and emerging environmental problems. Further, after identifying these problem areas, the professionals were asked to rank them in four different ways: in terms of the relative risks they posed for 1) carcinogenic effects in humans, 2) non-cancer effects in humans, 3) ecological effects, and 4) welfare effects. The results of that study were released in the Unfinished Business (UB) report in 1987 and generated considerable discussion within EPA and attracted significant attention outside the Agency.

When Mr. William Reilly became EPA Administrator, he quickly became interested in the UB report and its potential as a tool for guiding Agency action. Therefore, in the spring of 1989, he asked the SAB to apply its technical and scientific expertise to critiquing the UB report and suggesting options for reducing some of the highest ranking environmental problem areas.

C. The response of the SAB

The SAB accepted the invitation, following some initial reluctance on the part of some of the members.There was some concern that the project would take the Board more into the "risk management/policy" areas than was desirable. In the end, however, the Board embarked on a project that they defined via the following Goal Statement:

> "To provide decisionmakers and the public with the best technical and scientific knowledge available on the relative risks posed by different environmental problems and the options to reduce these risks."

In addition, they defined their charge as having four elements:

1. Provide a critical review of the UB report and add any new information which had become available since the original report in 1987.
2. Evaluate the health and environmental risks posed by major environmental problems.
3. Provide options strategies for reducing the major environmental risk areas.
4. Develop a long-term strategy for improving the assessment and ranking of risks and for assessing alternative risk reduction strategies.

Having accepted the challenge, the SAB moved quickly to organize itself to complete the job. The project was overseen by the Relative Risk Reduction Strategies Committee (RRRSC), which reported directly to the Executive Committee (EC). Three subcommittees were form. One focused on human health issues, while another, on which I served, was concerned with ecological and welfare issues. The third received input from the other two and developed strategic options to address the issues.

In all, the Reducing Risk effort involved 39 qualified individuals from across the country. These experts included individuals from the academic community, the industrial community, the environmental community, and the community of State regulators. In conformance with FACA, none of the members were Federal employees and all of the meetings were conducted in public session.

IV. The Reducing Risk report

After nearly a year and half of work that involved more than a dozen public meetings, the SAB presented Mr. Reilly with its Reducing Risk report in September, 1990. The report consists of a short, printed "overview" report, supplemented by three appendices, one from each of the subcommittees.The subcommittee reports are rich in analysis, options, and recommendations. The overview report, which is the focus of my remaining remarks, is a product of the parent committee and is more than simply a summation of the contributions of the three subcommittees.

A. Findings

In process of conducting its study, the SAB made eight specific findings that summarize the Board's assessment of the problem we were asked to consider. Some of the findings are answers to questions imbedded in the charge to the Board. Others were discovered in the course of Committee activities and are more general in nature. Both types of findings provide valuable insights for understanding the environmental problems we face in the 1990s.

1. The importance of Unfinished Business

The SAB found that the Agency's Unfinished Business report was a bold and much-needed step directed at comparing the risks of different environmental problems and suggesting an important shift in national environmental policy. While they found many areas in which the analysis could be improved (e.g., the definition of environmental problems considered and the data available to assess those problems), the SAB described the report as the first step toward a policy that attempts to match Agency and societal resources to health and environmental risks. The Board was favorably impressed by this ground-breaking effort.

2. Problems in ranking risk

The SAB identified some important shortcomings in the data and methodologies currently available for assessing environmental risks and the potential for reducing those risks. They found that as long as there are large gaps in key data sets, efforts to evaluate risk on a consistent, rigorous basis or to define optimum risk reduction strategies necessarily will be incomplete, and the results will be uncertain. The Board highlighted especially the limitations in adequately evaluating ecological resources.

3. The extraordinary value of natural ecosystems

The SAB found that the Agency has considered the protection of public health to be its primary mission, and it has been less concerned about risks posed to ecosystems. This imbalance is a manifest, if inadvertent, part of current national environmental policy.The Board finds this position to be shortsighted, emphasizing that human health and welfare ultimately rely upon the life support systems and natural resources provided by healthy ecosystems. National efforts to evaluate relative environmental risks should recognize the vital links between human life and natural ecosystems. Up to this point, they have not.

4. Time, space and risk

In the absence of definitive data to evaluate the comparative risks posed by different environmental problems, the SAB highlighted some basic principles which can guide the identification of the most significant problems. These included consideration of the number of people and organisms exposed to the risk, the likelihood of the environmental problem actually occurring among those exposed, and the severity of the effects, including economic losses and other damages involved, if the problem does occur. In addition, the Board identified time and space--the temporal and spatial dimensions--as two important factors useful in separating the greater from the lesser risks. For example, although all environmental problems are likely to be of legitimate concern, those problems that are widespread (e.g., global vs. local) and resistant to "quick fixes" (e.g., slow recovery of an ecosystem from exposure to long-lived chemicals vs. quick rebound to a normal state following removal of pollution) may be of greater importance.

5. The links between risk and choice

Twenty years ago pollution was generally viewed as a problem "they" (usually industry) created. We have now evolved in our thinking about environmental protection to realize that sources of risk often are to be found in the day-to-day choices made by individuals, communities, and businesses. These risks will not be reduced substantially, especially over the long term, if past patterns of individual community and business choices do not change in light of the relative risks posed by those choices.The SAB identified a variety of factors that effect those choices; e.g., education, ethics, economic incentives, laws, and regulations. The Board concludes that economic growth and reductions in environmental risk are not necessarily incompatible, if past patterns of choice can change.

6. Public perceptions of risk

The SAB found that many of the remaining and emerging environmental risks considered most serious by the general public today are different from those considered most serious by the technical professionals charged with reducing environmental risk. This dichotomy poses a challenge to the Agency in responding to the expressed desires of the public, on the one hand, and in effectively administering limited resources, on the other.The

Board does not conclude that the public is "wrong"; simply that their views are different, incorporating as they do, deeply-held subjective values, like justice and equity, in addition to some level of technical understanding of the problems. The SAB urges EPA to listen carefully to the public's perception about risk, balancing and re-balancing those views against the evolving technical knowledge about the range of environmental problems.

7. Relatively high risk environmental problems

Faced with significant gaps in the available data and methodologies for comparing risks, the Board nonetheless felt it was important to make some attempt to identify those environmental problems that might pose particularly high risks. The Ecological and Welfare Subcommittee relied primarily on the criteria of time and space (See Finding 4) in identifying four relatively high risk problem areas:

Habitat alteration and destruction
Species extinction and overall loss of biological diversity
Stratospheric ozone depletion
Global climate change

The Human Health Subcommittee felt more constrained by the data limitations in their area of concern. However, based upon the criteria of direct human exposure to known toxic agents, they identified the following as likely areas that would pose relatively high risks:

Ambient air pollutants
Worker exposure to chemicals in industry and agriculture

Pollution indoors

Pollutants in drinking water

In addition, this Subcommittee felt that a) pesticide residues on food and b) toxic chemicals in consumer products also have the potential of significant exposures (and risks) to large populations, although the data bases to support those concerns are not as robust as the four problems listed previously.

8. Strategy options for reducing environmental risk

In addition to reviewing Unfinished Business, the Board reviewed a broad spectrum of policy options available for reducing major environmental problems. Six generic risk reduction tools were identified that should be considered for any problem area. These tools were used to generate 60 specific examples of options that could be applied to 13 particular environmental problems. Criteria which could be used in selecting from among the various risk reduction options in any particular case were also recommended. The six tools are

Scientific and technical measures

Provision of information

Market incentives

Conventional regulations

Enforcement

Cooperation with other government agencies and nations

B. Recommendations

Based upon these eight findings and the more extensive reports of the subcommittees, the parent committee forged 10 recommendations that the Board presented to the Administrator--and the nation--for their consideration and implementation.

1. EPA should target its environmental protection efforts on the basis of opportunities for the greatest risk reduction.

Since this country already has taken the most obvious actions to address the most obvious environmental problems, EPA needs to set priorities for future actions so that Agency takes advantage of the best opportunities for reducing the most serious remaining risks. This recommendation is an affirmation of the comparative risk analysis approach initiated in the Unfinished Business report. EPA should take a larger view of its mission of environmental protection. Over the past twenty years the greater vision of a young, vigorous EPA has given way to a narrower picture of a maturing agency running its programs. Simply stated, in the view of the SAB, EPA is responsible for protecting the environment, not just for implementing environmental law. Thus, the Agency should assess and compare the universe of environmental risks and then take the initiative to address the most serious risks, whether not Agency action is required specifically by law.

2. EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk.

Because productive natural ecosystems are essential to human health and to sustainable, long-term economic growth, and because they are intrinsically valuable in their own right, EPA should be as concerned about protecting ecosystems as it is about protecting human health.From a technical perspective, there is a close linkage between human health and ecological health: you cannot have a healthy population in the long term without a healthy ecology, and you cannot have a healthy economy in the long term without a healthy population.These close linkages should be reflected in national environmental policy. Therefore, EPA's risk-based priorities for action should reflect an appropriate balance between ecological, human health, and welfare concerns. Furthermore, the Agency should communicate to the general public a clear message that it considers ecological risks to be just as serious as human health and welfare risk, because of the inherent value of ecological systems and their strong links to human health.

3. EPA should improve the data and analytical methodologies that support the assessment, comparison, and reduction of different environmental risks.

Although setting priorities for national environmental protection efforts always will involve subjective judgments and uncertainty, EPA should work continually to improve the scientific data and analytical methodologies that underpin those judgments and help reduce the uncertainty. There are questions associated with limitations in the database itself; e.g., what is the distribution of toxic chemicals in the environmental and what are the risks that remain undiscovered? In addition, there are fundamental questions in comparing risks; e.g., how does one compare risks which are qualitatively different from one another (cancer vs. non-cancer effects, and human health risk vs. ecological risk)? Further, we have just begun to work out systematically those questions that relate to methods for reducing risk; e.g., what is the full range of options available for addressing a particular environmental problem? Unfinished Business took the first steps to compare environmental risk; the appendices to this report describe more sophisticated approaches. EPA should ensure that these ideas are developed and tested in the years ahead, so that relative risk reduction can be used as an effective, continually evolving tool in the development of national environmental policy.

4. EPA should reflect risk-based priorities in its strategic planning processes.

The Agency's long-range plans should be driven not so much by past risk reduction efforts or by existing programmatic structure, but by an ongoing assessment of remaining environmental risk, the explicit comparison of these risks, and the analysis of opportunities available for reducing risks. EPA should consider soliciting the input of external groups and individuals with expertise and interest (both technical and lay) in setting this environmental agenda. This type of comparative risk analysis has been conducted successfully in a number of states and communities around the country. Such efforts should be augmented and supported in the future. Further, a major relative risk reduction review should be conducted on a national basis every several years. This exercise would include a disciplined analysis of the full range of strategy options (see finding #8) available to address the major problems.

5. EPA should reflect risk-based priorities in its budget process.

Although EPA's budget priorities are determined to a large extent by the different environmental laws that the Agency implements, it should use whatever discretion it has to focus budget resources on those environmental problems that pose the most serious risks. Such risk-driven changes in the budget need not occur overnight. Small, but consistent, changes would accomplish the same objectives and would parallel the Agency's improving proficiency in the analysis of relative risk. On a broader front, EPA should take the lead in ensuring that overall national efforts to reduce environmental risks are driven by cost-effective risk reduction strategies. As activities by organizations outside of EPA--at the Federal, State, and local levels--become increasingly important to the nation's risk reduction efforts, the Agency should guide, inform, and help coordinate those efforts, by sharing its most up-to-date, comprehensive understanding of relative environmental risks and the options available for reducing them.

6. EPA--and the nation as a whole--should make greater use of all the tools available to reduce risk.

Although the nation has had substantial success in reducing environmental risks through the use of government-mandated end-of-pipe controls, the extent and complexity of future risks will necessitate the use of a much broader array of tools, including market incentives and information. Continued use of command-and-control regulations, coupled with effective enforcement, is critically important for maintaining and furthering the progress this nation has made on a great number of environmental problems. However, to address many of the remaining and emerging environmental problems, EPA should take the lead in examining and applying, as appropriate, more innovative, cost-effective risk reduction strategies. The Agency should make more of an effort to inform and encourage other elements of society; e.g., businesses, schools, State and local governments, to use this broader range of tools.

7. EPA should emphasize pollution prevention as the preferred option for reducing risk.

By encouraging actions that prevent pollution from being generated in the first place, EPA will help reduce the costs, intermedia transfers of pollution, and residual risks so often associated with end-of-pipe controls. History has shown us (e.g., at Department of Energy nuclear weapons plants and innumerable Superfund sites) that after-the-fact cleanup costs can be enormous. Thus, end-of-pipe controls and waste disposal should be the last line of environmental defense, not the front line. In many instances pollution prevention is the only alternative for addressing effectively significant residual risks that remain after maximizing end-of-pipe controls. Increasingly, the nation is becoming aware of the benefits--including economic benefits--attached to a pollution prevention strategy and of the fact that other countries, who are our economic competitors, have made considerable progress in this area. Therefore, EPA should take the lead in encouraging, demonstrating, and adopting pollution prevention as the strategy of choice.

8. EPA should increase its efforts to integrate environmental considerations into broader aspects of public policy in as fundamental a manner as are economic concerns.

Other Federal agencies often affect the quality of the environment; e.g., through the implementation of tax, energy, agricultural, and international policy, and EPA should work to ensure that environmental considerations are integrated, where appropriate, into the policy deliberations of such agencies. Many of the remaining and emerging environmental problems involve dispersed sources of pollution governed by activities and behaviors not directly or solely affected by Agency legislative mandates; e.g., habitat destruction, indoor air pollution, non-point source water pollution, and elimination of forests on a global scale. In order to facilitate the government-wide integration of environmental policy, the EPA Administrator should encourage the President to create a cross-government forum where such integration would be explicitly considered and carried out.

9. EPA should work to improve public understanding of environmental risks and train a professional workforce to help reduce them.

The improved environmental literacy of the general public, together with an expanded and better-trained technical workforce, will be essential to the nation's success at reducing environmental risks in the future. EPA should work to reduce the gap between public perceptions of risk and the scientific understanding of risk, in part, by sharing information on the relative risks posed by different environmental problems. The Agency should include broad public participation in its efforts to rank environmental risks. In addition, EPA should take the lead in helping the nation confront the growing shortage of environmental scientists and engineers needed to cope with current and future environmental problems. As the nature of the problems continue to change, the existing professionals need continuing education and training to help them understand and use the complex control technologies and pollution prevention strategies needed to reduce environmental risks more effectively. EPA has a responsibility to address this problem.

10. EPA should develop improved methods to value natural resources and to account for long-term environmental effects in its economic analyses.

Because traditional methods of economic analysis tend to undervalue ecological resources and fail to treat adequately questions of intergenerational equity, EPA should develop and implement innovative approaches to economic analysis that will address these shortcomings. Since many of our actions are impacted by economic considerations, it is important that the techniques employed in such analyses account for environmental assets in an appropriate manner. This is not currently the case. As a first step, EPA should commission a study that surveys the ideas of ecologists, economists, social scientists, and other experts from inside and outside the Agency. The study should attempt to develop a way of incorporating ecological investments into a concept of sustainable growth. Environmental economics is a controversial, complex, and rapidly-evolving field.EPA should take the lead in developing methods of analysis that will give fair consideration to investments that will protect the natural resource base for future generations.

V. Closing

This concludes my prepared testimony. I would be happy to address any questions and comments you might have.

Mr. KOPETSKI. Dr. Huggett, I certainly appreciate your testimony. I thought you did an excellent job summarizing it. Our colleague from Pennsylvania is playing ping-pong a little bit this morning with some of his committees. He is on a short time frame. I would ask if just before we go to questions to, if we could ask Mr. Bretthauer to join us at the table again as Mr. Ritter has a couple of questions. Then we will return to Dr. Huggett with more questions.

Mr. RITTER. Thanks, Mr. Chairman. Again, I apologize for this back and forth. It is an occupational hazard. We are supposed to be, at many times, in at least two places at the exact same time. It is one of those things that you just have to be aware of.

How do you see, Mr. Bretthauer, the ORD role in conjunction with the program offices, the regulatory program offices? How good is the connection between what you are generating in the R&D domain, and those responsible for carrying out or setting, really, and then enforcing the regulatory policy?

Mr. BRETTHAUER. Congressman, we work very hard at that particular connection. We have a research committee set up with each of those program offices where we try to understand their technical needs. We try to develop products then that meet those needs in a time frame that is appropriate to their need.

I would like to say it is perfect; it certainly isn't. Communications can always be improved. They work on statutory mandates. They are not necessarily risk based, so we don't always address the highest risk in that situation when you have Congressional mandate. I believe the coordination is all right. It certainly can be improved.

Mr. RITTER. In other words, we really want to have the communication on these ideas of ranking of hazards, or putting these hazards in some kind of perspective regarding their danger to human health and the environment. When you really want to have that communication take place is prior to the rule-making process. So, you do have a legislative mandate, to be sure, from the statute.

Are they making sufficient use of the half-billion dollar a year, taxpayer funded, R&D budget that EPA has, especially in this area of assessing risks and trying to make some sense out of which risks are worst? And, how in the setting of rules do you try to accommodate the science base to these different hazards?

Mr. BRETTHAUER. Well, I would be less than truthful if I said that a research program always addressed the highest risk. The programs that negotiate with what we call the media offices represent a consensus of what they believe that they need to meet their statutory mandates and what we believe is possible.

Those mandates are not necessarily risk based. They are based on Congressional guidance. What we are doing with the flexibility that we have, which is a great deal, but we are trying to use that budgetary flexibility that we have to try to orient those resources toward the highest risk. That is certainly our intention. It is the intention of the Administrator. It is simply the allowable discretion that you have in your budget for that.

Mr. RITTER. Let me ask this.

Mr. BRETTHAUER. Yes.

Mr. **Ritter**. Could we do a better job if you had some greater discretion?

Mr. **Bretthauer**. I believe we could.

Mr. **Zimmer**. In other words, if ORD—yes. We might just get the response of the SAB members here. Do you feel that that would be helpful—some greater discretion to the ORD in terms of their allocating their budget? Would that be helpful to making the process work better?

Dr. **Huggett**. I certainly think it would allow a more expedient way to address relative risk, allow more resources to be focused in this regard.

Mr. **Ritter**. You are going to have to give us some good advice as to how we in the Congress could help you to use your resources more effectively. We are aware of what the obstacles are now and what we can conceivably do in this authorization, starting with this authorization, to make you all more effective and actually get a cleaner environment out of it.

Mr. **Bretthauer**. Congressman, we are doing one thing you might be very interested in. We are trying to target and develop our 1993 budget based on a series of issues which can be risk ranked. In other words, the increases that we would come to the Congress for fiscal year 1993 would be built around a set of issues. These issues will be ranked on the basis of risk. So the program—the increases that we would propose, hopefully in our 1993 budget, will be issues that are agreed on in a risk based approach for increases to our program.

We hope that this type of planning would eventually permeate all of the research planning process, recognizing that you are always going to have to do those things that don't come up on a high risk basis that Congress asks you to do. We try to follow the intent of Congress as much as we can.

Mr. **Ritter**. I think we must move from the risk-of-the-month club to a more long range perspective.

Let me just close with this question. What role does ORD play—no. I want to ask the question: What office in ORD is specifically responsible for working with the program offices to gain greater consistency of their decisions, and incorporating risk assessment when they can, when legislative mandate allows?

Mr. **Bretthauer**. Congressman, there are two offices that work with the program offices on a regular basis to take risks in more of a factor in its decision making. One is our Office of Environmental Health and Ecological Assessment where they develop guidelines for health risk assessment, ecological risk assessment, so that the Agency can do risk assessment in a more uniform manner.

We also have our Office of Tech Transfer and Regulatory Support, which tries to see that the regulations, the rule- making procedures that the offices use are consistent and organized around the best science possible. They are the ones that are kind of the gatekeeper for seeing that the best science is integrated in the programs. The two office directors that head those two offices that sit behind me, Dr. Preuss representing the Office of Tech Transfer and Regulatory Support, and Dr. Bill Farland who represents the Office of Health and Ecological Assessment.

Mr. **Ritter**. Are those offices—is there anything we can do to massage that linkage to make it work better, to help you to make it work better? I mean, you hear so often out in the field how EPA knows in their science and research domain what is going on out here, but, boy, these guys out here don't seem to understand. Sometimes, it is the mandate. The mandate doesn't allow you to consider certain aspects of these features. It is that simple. But, there has got to be a way that the connections are smoother, more expeditious, more important in the final decision process, as you go into making these rules and setting these rules.

Mr. **Bretthauer**. Yes. I would ask that you take a look at our planning process that we are proposing for next year and beyond. We would be very interested in your comments there. We believe that it is going to move toward doing exactly what you indicate—a closer connection between risk based priorities and involvement of all of the best science, our laboratory science, into those risk based issues. So we are very hopeful that this is an important step toward achieving that goal.

Mr. **Ritter**. Mr. Zimmer.

Mr. **Zimmer**. Quickly, Bill Ruckleshaus has written—a former EPA administrator and CEO and Chairman of BFI, has written about the use of quality management, total quality management. That is, trying to bring the quality of management revolution into our bureaucracy, and, particularly, he was focusing on EPA bureaucracy.

Is it possible that these connections would be more readily achieved if there was some kind of a thrust toward total quality management within the Agency, that allowed the free flow of interaction between the scientific side and the regulatory side?

Mr. **Bretthauer**. I believe so. Although you may not be aware, TQM is a major initiative for our administrator and especially of our Deputy Administrator, Hank Habicht. We are trying to use TQM to look at all of our processes. Continuous improvement, working well to understand our clients' needs, is an important aspect of it.

Mr. **Ritter**. Will the risk assessment forum fit into that?

Mr. **Bretthauer**. Well, the risk assessment forum tries to bring the—to pull the various scientists in the Agency, which are not only in ORD, but occasionally in other program offices as well, to bring a consensus of scientific opinion on a particular issue. It is an important part of our process to develop our procedures, our rules and our priorities more on a risk basis. But it is only one part of a number of important organizational aspects and procedures that are necessary. I wouldn't want to put too much emphasis on that one particular aspect.

Mr. **Ritter**. I want to thank the Chairman for his indulgence, and just say that I think once you get the smoke out, and once you deal with the poisoned waters, and you get into a next kind of a secondary level of risks, these kinds of processes are absolutely essential, and, I think, crucial to whether or not we will do a good job, in this next generation of environmental clean-up and focusing on priorities, or whether we'll shoot our wad as part of the risk-of-the month club.

Thank you, Mr. Chairman. I yield back.

Mr. **Kopetski.** Very good. Very good questioning and testimony. Before we take Dr. Neuhold's testimony, Mr. McMillen, did you have some questions at this point?

Mr. **McMillen.** Thank you, Mr. Chairman. I certainly appreciate the opportunity to be here.

Mr. Bretthauer, I am curious to expand some of the comments in your testimony. It seems that so often we are dealing with cross currents here. On one hand, we want to have a more science based expenditure, driving our environmental mitigation and prevention efforts.

On the other hand, it seems to me that sometimes there is a concern that the more R&D that you do, that you find more risk and in fact, more needs to mitigate in the environment? Is that a cross current that is at work that in fact as you go out and do more R&D indoor air pollution or whatever, there is a concern that you raised public expectations; therefore, requiring more expenditures to clean up things?

Mr. **Bretthauer.** Congressman, that is always a possibility. When you do research, you are going to find additional problems. Society is going to expect you to deal with those problems. But there are occasions where it doesn't work that way. Additional research indicates that the problem wasn't as large as we initially thought. You can put balance on it. You know how to deal with it effectively.

So although many times it is the case you find additional problems, that certainly isn't true in all cases.

Mr. **McMillen.** You know, when we did the Clean Air Bill last year—a very complicated bill, we dealt with a lot of end of pipe controls, mandates and the like. Is any of your R&D designed to try and come up with more creative strategies to deal with these environmental problems and possibly more innovative and cost effective risk reduction strategies?

Mr. **Bretthauer.** My own belief is that the current generation of control measures work reasonably well, but in order to address all of the environmental problems we are seeing in the 1990s and beyond, they are very, very expensive. Society is going to be paying a lot of money to implement them. What we really need is to move a research program toward addressing really innovative technologies, and those that offer an order of magnitude improvements in both costs, and hopefully benefit over existing technologies.

If you look at our budget for fiscal year 1993, you see a couple of items in there that really strike that cord. For example, bioremediation, which offers the potential, we believe an important potential, of dramatically reducing the costs of dealing with hazardous wastes as compared to the current technology.

There are other examples as well. We really believe that that is what has to be done in order to make it affordable to society.

Mr. **McMillen.** Being more specific with regards to the Clean Air Act, what would be—as opposed to what was implemented, what would be that next generation of control that you were referring to?

Mr. **Bretthauer.** I am not sure which part of the Clean Air Act that you are talking about. If you are talking about acid deposition, for example, which is an important part of the Clean Air Act, we have been working for several years on a new type of technology, which has the potential to reduce by 50 percent both the capital costs as well as the operating costs as compared to scrubbing technologies. That technology will be tested, hopefully, over the next year or two in cooperation with the private sector and TVA in a large demonstration project.

So that is an example of the type of technologies where it would cut into both the capital costs and the operating costs with about the same level of efficiency that we believe is important.

Mr. **McMillen**. How about urban problems, urban smog and so forth? What would be some of the alternatives that you are working on in those areas? I mean, as you know, the Clean Air bill put some phased-in mandates, but what would be some of these other alternatives?

Mr. **Bretthauer**. I don't know in respect to ozone mitigation. I can't necessarily give you technologies. I can tell you there are approaches that we are looking at very seriously.

Mr. **McMillen**. Or toxics?

Mr. **Bretthauer**. Let me talk a little bit about ozone. There is a substantial component in our research program, which looks at the role of biogenics, naturally occurring in volatile organic compounds, and their role in the formation of ozone. It is extremely important for us to know that because there is some feeling that moving on with existing technologies or controlling of thropogenic VOCs might be at the point of diminishing returns. We need to really understand the role of those biogenic components. So we have an important part of our research program. While it is not technology, it may indirectly affect technology toward dealing with that important problem.

Mr. **McMillen**. I think the main thrust of this hearing is the concern in Congress as to how important your mission, but how underfunded your mission is. We think that if we are going to have the kind of science based environmental mediation in the future, that it is going to have to come from your office, and we are going to have to fund it.

Thank you.

Mr. **Kopetski**. Thank you, Mr. Bretthauer, for coming up here again. I don't think there is going to be any more questions if you have another appointment.

Before we take questions for Dr. Huggett, I would like to receive the testimony of a very patient man, Dr. John Neuhold.

Dr. **Neuhold**. Thanks for recognizing my patience.

STATEMENT OF DR. JOHN NEUHOLD, EMERITUS PROFESSOR, UTAH STATE UNIVERSITY

Dr. **Neuhold**. I am John Neuhold, an emeritus professor at Utah State University and long time student of environmental research and EPA and its predecessors in both its research and its administration.

I have served as chair of the Science Advisory Board's environmental research planning programs for the Agency, as well as its Budget Review Committee for the last five years. Therefore, I have a bit of a sense of history about the organization and the way it might operate, about how it operated in the past and how it might operate in the future.

Our committee's report, I might add, was done in a rather hurried time frame. So we have some inconsistencies. We noted those inconsistencies as testimony was going on. I would ask the committee's indulgence to accept an amendment to our presentation here, which I will get to you tomorrow, I think.

Generally speaking, the changes that we are including in the amendment will not be all that critical to what we have already said in the report.

Briefly, to summarize: Our major concerns with the ORD budget is a fact, as you have already noted, that we are— instead of pulling ahead in terms of buying power, falling behind. Our rate of increase is diminishing from year to year. We as the Science Advisory Board are awfully concerned about this, particularly with emerging environmental problems.

The Agency has had a lot more to do now than they had 10 or 12 years ago in terms of issues and problems that it has to address, and it has less money to do it with and less people. So that was one of our major concerns.

As was mentioned earlier and as we had indicated, one percent of the total EPA budget should be put into research. It would not be an untold practice to put that amount into research by any functioning industrial agency as well as the regulatory agency, such as the Environmental Protection Agency is.

As has also been mentioned earlier, the Board has responded, I think, fairly admirably to the recommendations put forth by the two reports of the Science Advisory Board, "Future Risk," and "Reducing Risk." However, we still see some problems that need to be challenged. We don't think that there is enough being put into the area's epidemiologic research as Dr. Goldstein had pointed out. We believe that training for environmental scientists is being shortshrifted. The research on value of natural resource and economic analyses, we think, needs to be engendered and supported more strongly than it has in the current budget.

The question on infrastructure remains an important question. The amount that the President's budget has requested to increase in this area would extend the original projections for coming up to speed for scientific equipment from a five-year period to about a fifteen-year period, assuming a seven-year turn-around on the equipment itself, which is putting an average that is a pretty well accepted time frame for equipment usability.

Also, we are concerned with the professional development, both within the agency and external to the Agency. In last year's testimony, we recommended that the Congress and the Environmental Protection Agency both consider the establishment of a training program, budget training program, at various environmentally oriented research academic institutions.

I reiterate that particular recommendation. I think it is important. We are falling way behind in terms of the availability of these types of scientists—environmental scientists. We need the support in the academic community to build a pool of talent to service the various issues that are coming up in the research area in the environmental arena.

We also have a number of specific recommendations to make about the various media programs within the Agency, not the least of which is again our continuing recommendation that we should continue to support to a greater extent the Centers and Grants Program. Where we feel that one percent of EPA's overall budget is a wise amount of expenditure and research area, one percent of that budget should really be directed to basic or fundamental research. Upping the entire Grants and Centers Program to that level would very desirable as far as the Science Advisory Board is concerned.

With those comments, I will conclude my remarks, and be open to any questions.

Mr. KOPETSKI. Thank you, Doctor, very much.

I want to go back to Dr. Huggett first.

As we discussed, the EPA budget for 1992 is less in real dollars than it was in 1981. How can we expect to fill the substantial gaps in our knowledge concerning actual human exposure to hazards and ecosystems welfare, which are essential if we intend to carry out sound risk comparison?

Dr. HUGGETT. Please don't take this as a trite answer, but we can't. It can't be done. We have to take what little amount of money we have. We have to funnel it much like a combat physician or a nurse would do a triage. There are some things that we may not be able to do anything about. There are some things we can, and we have to funnel our money there. But we can't do everything at this point in time.

Mr. KOPETSKI. Certainly, we all are very much aware of our limitations of dollars at the Federal level—I am from Oregon and I know we have a great research facility with Oregon State, and our State is strapped for money as well. I guess I have a question for both of you.

That is, what about getting a little more creative in terms of the partnerships with the private sector? What is going on in that area? Are we really reaching into that? We have a lot of high technology firms in Oregon, believe it or not, who are in the timber industry with some of the dioxins that are used for the leaching process.

What is going on there? Are we reaching out?

Dr. HUGGETT. I can start. I think, that there are basically two avenues that are being taken today as far as cooperation with industry. One is that academia is often called on by the industry to respond to environmental problems, but within a very narrow framework because the methodologies, the technologies, et cetera, are mandated by rules and regulations of EPA. In other words, it is not innovative thinking; it is not research; it is grunt labor that we'll hire a graduate student to do. Once the job is over and done, you really haven't pushed science any farther back. You have answered a need at the time.

The other way is to indeed invest in research dollars and in efforts to hopefully come up with a better way of doing business. For the most part, it's been my personal experience, that industries will do that if they can make money on it and they can show a profit at the end of this thing. They are not into giving their money away obviously.

Mr. Kopetski. Well, making money, though, Doctor, can also be in the form of saving money.

Dr. Huggett. Absolutely.

Mr. Kopetski. So they know that it is in their best interest for hazardous materials type of research, for example.

Dr. Huggett. There is some of that, and it has been absolutely essential. But again, I think that many—it has been my experience again working with industries, that they feel that their major need is to respond to the mandates, statutes and rules and regulations are on them first. Then hopefully we can push beyond that.

Mr. Kopetski. Dr. Neuhold?

Dr. Neuhold. Yes. Actually, the Board in the Environmental Protection Agency has had a record of working with industry in certain instances. The Centers Program, for example, has developed a program in lime injection technology with industry and with academia that I think is a good example of that.

However, there is another example, another model to follow that might be useful for the Congress to consider. That is the model that was put forth by EPRI, the Environmental Power Research Institute, in which the wattage is surtaxed and that money is then turned over to the Institute and distributed in research mode.

I think that this type of an operation should be explored to see if it is a possible way of infusing more money, research funds into environmental research in a more organized way.

Mr. Kopetski. Dr. Huggett, your testimony underscores the dearth of information available on the overall welfare of our ecosystems. Is it worthwhile to decrease funding for other EPA research programs in order to increase the funding for EPA's EMAP program?

Dr. Huggett. Well, EPA's EMAP program has just started. Hopefully, it will receive more funding as it becomes more and more firm in its plan and its methodologies. I personally think so. I personally feel that as we look around us, the quality of our environment has decreased. Right now, EPA has that mandate to protect the environment. There aren't—there are very few, let's put it that way, other sources of funding for research for the environment and for the programs. I think it is incumbent on us to increase whatever we can do.

Mr. Kopetski. Dr. Neuhold, last year's appropriation cut in the EPA budget resulted in a decrease of $24 million in the land R&D programs. Many programs in which the committee has expressed concerns, such as the indoor air quality, the research centers, EMAP, and exposure research suffered funding cuts. How did programs such as these end up on ORD's chopping block, and how we avoid this in the future?

Dr. Neuhold. I think as Dr. Bretthauer pointed out, they made an effort to distribute these cuts in such a way that it would not permanently damage any of the programs. I think of the 38 programs that suffered cuts, only one very small program was cut out entirely.

How to go about getting some assurances that this sort of thing doesn't happen in the future is really a difficult question to answer because obviously the Congress is faced with budget limits and must impose sometimes cuts on the Agency, which the Agency then has to redistribute.

The planning process that the Agency is now in the process of changing, which I am, incidentally, not completely familiar with. The proposed changes have not been made public to us. But at least the planning process that has been in place is a mechanism whereby the priorities for redistribution of funds can be made in a rational manner. To my knowledge, they have been well exercised in the last few years at least.

Mr. KOPETSKI. A final question that I have is this. Public opinion polls show that hazardous waste is among the top concerns of the public, and rightfully so. However, the EPA scientists and SAB, it is my understanding, believe that species distinction and loss of biological diversity pose a much greater long term risk. Certainly, we in the northwest are bumping up against these issues directly.

I understand that EPA is currently spending about $150,000 on a biological diversity research program. What are the plans for fiscal year 1992? What are your recommendations in terms of the funding levels?

Dr. NEUHOLD. Actually, in terms of direct work and diversity, that $150,000 is correct. But we are spending somewhere in excess of $20 million in the EMAP program, which does have a very strong biological diversity aspect to it. That is one of the ecological parameters that are proposed for monitoring in the entire program.

So the research that is involved with that is trying to determine specifically which bio-diversity indicators are usable in a monitoring sense. So there is substantially more work going on in that area than appears in the budget itself.

Mr. KOPETSKI. Is it species specific, or is it looking at a generalization?

Dr. NEUHOLD. Well, there are two components to it. There is both an internalization component and a species specific component. As you know, Spotted Owl and the Western Conifer, for us is a rare and endangered species problem. That is one of the concerns of EMAP as well. To look at those species, which are in the imminent danger of being lost.

The internal component has to do with something that is much broader. Basically, from an ecological principal point of view, we are concerned that an ecosystem maintains its diversity. Depending upon the ecosystem and the state of that particular ecosystem, the kinds of organisms and the kinds of functions that those organisms perform are of more concern to the specific organisms themselves. So that is what we are concerned with as far as species diversity is concerned with at that point.

Mr. KOPETSKI. In terms of your internal research program, the work product of this, will it result in application to, let's say, the southeast, Louisiana, the Everglades?

Dr. NEUHOLD. Yes. The thing that they are trying to develop is a generality of application. The EMAP program has been divided up into several major areas, among which are arid lands, agricultural systems, forests, wetlands and coastal area. The generality that is developed is presumed, and we hope, will function on a broad basis throughout the continental—well, the total United States area.

Mr. **Kopetski**. What is a time frame in terms of coming up with some sort of standard?

Dr. **Neuhold**. Well, the program was implemented last year. The EMAP program was implemented last year in a planning mode. In demonstration mode, it started this year, particularly with the coastal ecosystem being the initial kick-off point.

My guess is that—the thing has been phased. These different areas are going to be phased in over a five-year period. My guess is to make them completely operational. That we should look at a time frame of something of between five and ten years from now. It is a long term program. There is no question about that.

Dr. **Huggett**. I might add that the understanding data that comes out of EMAP will become more valuable as time goes on. It is a status and trends type of program, among other things. In order to determine whether the environment is healthy and whether the environment is changing to such things as global warming, the data set will have to be continuous for some period of time. It is not a snapshot in time, but rather a picture. So as the program goes on, then more and more will come out of it with a better understanding of more data, and better control hopefully.

Mr. **Kopetski**. On some of these—my final question, I guess, is what kind of coordination goes on with like the Forest Service and your research?

Dr. **Neuhold**. The Agency has made a very concerted effort, in my opinion, in getting the help of the Department of Agriculture and not only the Forest Service, but also ARS, Soil Conservation Service, the Department of Interior with the Fish and Wildlife Service. The Bureau of Land Management is involved. Particularly the USGS has been involved, particularly since they have had substantial experience in the area of doing water quality monitoring for many years, as well as doing a good deal of LANDSAT base type of mapping and—well, predominantly mapping, but it is technology that can be applied to mapping ecological characteristics in the landscape.

Mr. **Kopetski**. I certainly want to thank you for your time this morning. You have been very helpful to the committee.

The committee is adjourned.

[The report of the Science Advisory Board on the ORD budget follows:]

(short)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EPA-SAB-EC-91-005

OFFICE OF
THE ADMINISTRATOR

March 8, 1991

Honororable James H. Scheuer
Chairman
Subcommittee on the Environment
Committee on Science, Space, and
Technology
U.S. House of Representatives
Washington, D.C. 20510

Dear Mr. Chairman:

The Science Advisory Board's (SAB) review of EPA's research and development budget began as a critique of the annual Office of Research and Development (ORD) Research Outlook. After performing this review for several years, the Board became frustrated that the elements of this document did not have priorities attached to them as is explicit when activities are associated with budgeted dollar amounts. Since the initiation of the annual review of the budget six years ago, the SAB has been able to examine not only the disciplinary areas addressed by ORD, but also the extent to which those areas are emphasized within the overall plan.

The annual budget review has been designed around the following charge:

☐ How does the proposal compare to the previous year in both absolute and constant dollars, and; how are resources distributed across the variuos media and disciplinary areas?

☐ What programmatic changes have been effected in the base program? Are new proposals relevant to Agency needs? Is there a critical funding mass for those initiatives and associated base efforts? Are infrastrucure needs adequately addressed? Are the proposals consistent with the Core strategy and the Future Risk documents?

In order to obtain a detailed overview of the ORD program, the review focuses on: 1) areas of scientific uncertainty and 2) priorities assigned in pursuing both fundamental and applied research. The final, complementary factors taken into consideration are the staffing, equipment and facilities necessary to successfully undertake proposed research studies.

The Subcommittee uses materials that ORD's Research Committees have prepared for the budgeting process and also meets with the relevant ORD senior staff in an open interchange to gain further understanding of the proposals. Finally, the implications of the budget request are put into perspective by analyzing them with respect to previous reviews conducted by the board.

The Science Advisory Board applauds ORD's continuing efforts to implement certain recommendations in the "Future Risk" and "Reducing Risk" reports (SAB-EC-88-040 and SAB-EC-90-021). However, continuing budgetary disruptions consistently hinder its management's ability to stabilize its core program and expand high priority areas which are sorely underfunded. In light of these circumstances, the Board strongly recommends significant increases for ORD over the next 5 years. Several specific activities which should receive immediate attention include:

☐ inadequate base for replacement/upgrade of scientific equipment

☐ insufficient funding to cover salary and expense costs

☐ lack of training resources for scientific staff

☐ insufficient funding for competitive grants and centers

The following report contains the views and conclusions of the Budget Review Subcommittee of the SAB. However, due to the late release of the President's Budget and and the need to provide review conclusions to the House Subcommittee on the Environment (Commmittee on Science, Space, and Technology) prior to their hearings, full Committee review was not possible. Consequently, the recommendations and conclusions herein are subject to some modification in the near future.

We are pleased to have had the opportunity to conduct this review and look forward to your response to the priority needs identified here and to your view of the prospects of improvements in the future.

John M. Neuhold

Dr. John Neuhold, Chairman
R&D Budget Review Subcommittee
Science Advisory Board

EPA
U.S. Environmental Protection Agency
Washington, D.C.
EPA-SAB-91-005

Report of the Research And Development Budget Review Subcommittee

Review of the Fiscal Year 1992 President's Budget for Research and Development

A SCIENCE ADVISORY BOARD REPORT

March, 1991

U.S. ENVIRONMENTAL PROTECTION AGENCY

NOTICE

This report has been written as a part of the activities of the Science Advisory Board, a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide balanced, expert assessment of scientific matters related to problems facing the Agency. This report has not been reviewed for approval by the Agency and, hence, its contents do not necessarily represent the views and policies of the Environmental Protection Agency, nor of other agencies within the Executive Branch of the Federal government, nor does mention of trade names or commercial products constitute a recommendation for use.

ABSTRACT

ORD has responded admirably to a myriad of environmental concerns facing our nation, and even the world. Still, it will continue to be incapable of providing an adequate response to environmental issues without a significant infusion of resources. Base programs (both core and non-core and including professional development) must be shored up to prevent further erosion of the in-house capabilities. Extramural resources (including those for competitive grants, centers, and professional fellowships) must be increased in order to foster innovative and timely research by other leading researchers in the environmental research fields. Finally, serious attention must be paid to the aging equipment and facilities (infrastructure) of the organization through increases each year which are earmarked for these areas.

Key words: core, extramural, infrastructure, budget, research

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1.0 EXECUTIVE SUMMARY

The Science Advisory Board (SAB) applauds The Office of Research and Development's (ORD's) continuing efforts to implement certain recommendations in the "Future Risk" and "Reducing Risk" reports (SAB-EC-88-040 and SAB-EC-90-021). However, continuing budgetary disruptions consistently hinder its management's ability to stabilize its core program and expand high priority areas which are sorely underfunded. Compounding these problems is an inadequate base for replacement/upgrade of scientific equipment, insufficient funding to cover salary and expense costs and lack of training resources for scientific staff. In light of these circumstances, the Board strongly recommends significant increases for ORD over the next 5 years. Specific findings and recommendations include:

1) The 1992 budget numbers are somewhat deceptive. Although the total request reflects an increase in nominal dollars, it provides considerably less buying power than was available in FY 1981. In addition, the R&D total is somewhat skewed by a shift of equipment dollars from the S&E appropriation from 1990 to 1991 (which was not fully funded in the final FY 1991 appropriation). Consequently, ORD programs do not reflect the full increases noted in the 1992.

2) As mentioned earlier, ORD has responded admirably to certain recommendations in "Future Risk" and "Reducing Risk". However, several areas have been inadequately addressed. These issues include epidemiologic research, training for environmental scientists, research on valuing natural resource and economic analysis.

3) ORD is striving to improve its infrastructure by earmarking specific lump sums for capital equipment and operating expenses. However, the increases to the S&E and R&D appropriations fall very short of providing adequate funding for ORD laboratories to become state-of-the-art.

4) ORD should implement a professional development program for its scientists and funding should be provided to establish a fellowship program for training environmental scientists.

Specific recommendations for various media include the following:

1) The effects of chronic ozone exposure should receive higher priority (Air).

2) Exposure research should be more carefully planned and coordinated in order to maximize the use of resources and avoid overlap (Cross-cutting).

3) Research on exposure to and effects of radon and electromagnetic radiation should be expanded (Radiation).

4) Decreases in the wastewater treatment technology area should be restored (Water Quality).

5) Research efforts on disinfectant by-products should not be reduced (Drinking Water).

6) Efforts in ecological risk assessment and field validation in pesticides and toxics should be dramatically increased (Pesticides and Toxics).

7) Funding for academic research centers should be doubled in order to provide funding for 8 centers as should funding for extramural grants (Multimedia).

2.0 INTRODUCTION

2.1 Development of the SAB Budget Review

Science Advisory Board (SAB) review of EPA's research and development budget began as a critique of the annual ORD Research Outlook. After performing this review for several years, the Board became frustrated that the elements of this document did not have priorities attached to them as is explicit when activities are associated with budgeted dollar amounts. Since the initiation of the annual ORD budget review, the SAB has been able to examine not only the disciplinary areas addressed by ORD, but also the extent to which those areas are emphasized.

In order to obtain a detailed overview of the ORD program, this review focuses on: 1) areas of scientific uncertainty and 2) priorities assigned in pursuing both fundamental and applied research. The final, complementary factors taken into consideration are the staffing, equipment and facilities necessary to successfully undertake proposed research studies.

The committee uses materials that ORD's research committees have prepared for the budgeting process and also meets with the relevant ORD senior staff in an open interchange to gain further understanding of the proposals. Finally, the implications of the budget request are put into perspective by analyzing them with respect to previous reviews conducted by the Board.

The following report contains the views and conclusions of the Budget Review Subcommittee of the SAB. However, due to the late release of the President's Budget and the need to provide review conclusions to the House Subcommittee on the Environment (Commmittee on Science, Space, and Technology) prior to their hearings, full Committee review was not possible. Consequently, the recommendations and conclusions herein are subject to some modification in the near future.

2.2 Basis for Review

In the past four years, the SAB has produced two reports ["Future Risk: A Research Strategy for the 1990s" (SAB-EC-88-040, September 1988) and "Reducing Risk: Setting Priorities and Strategies for Environmental Protection" (SAB-EC-90-021, September 1990)] that highlighted perceptions of critical needs which must be addressed in order to gain control over our environmental future. These reports have each provided ten recommendations used by the Budget Review Subcommittee as part of its interpretation of the proposed ORD budget. In this process, the Subcommittee compared the 1992 budget proposal to the 1991 operating year program in an effort to determine ORD's progress in implementing its overall research plan.

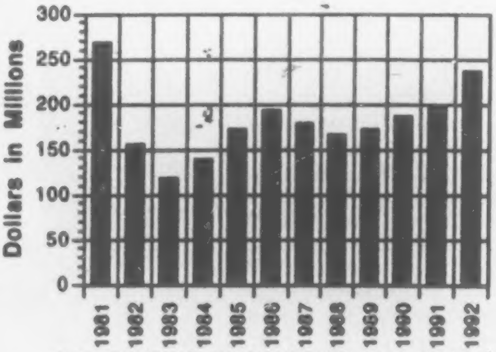
The recommendations in "Future Risk" and "Reducing Risk" address research needs in pollution prevention, long-term and exploratory efforts, risk reduction (in both humans and ecosystems), and technical training for environmental scientists. The Board feels that, given the emphasis afforded to these areas in both reports, the budget proposal should reflect strong support for each.

3.0 BUDGET OVERVIEW

3.1 Funding

In "Future Risk," the SAB recommended that the research budget for 1988 be doubled to about $700 million by 1993 (assuming no increase in the consumer price index). This translates into an average increase of $70 million per year over a 5 year period to effectively addressed new tasks stemming from the increasing complexity of environmental issues. Since the release of the "Future Risk" report, ORD has fallen short of its goal. Although the current (1992) budget proposes an increase of $57.8 million, its impact is somewhat deceiving. Due to mandatory reductions of $24 million in the FY 1991 budget, an actual increase of $34 million is requested after restoration of prior year cuts. Disregarding this budgetary anomaly, the Research and Development request reflects a 13% increase (from 254.9 million to 313 million); Salaries and Expenses increase from $103 million to $109 million(6%); Superfund declines from $73.6 million to $68.6 million (6.7%); and LUST remains static at $0.8 million.

Figure 1



ORD FUNDING IN CONSTANT 1982 DOLLARS

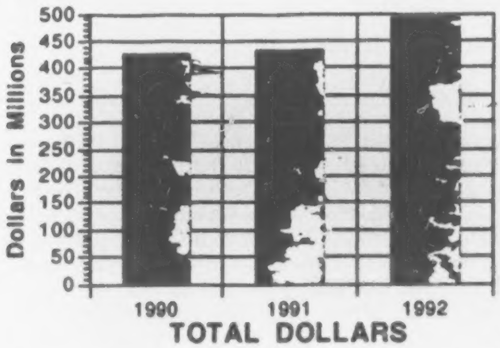
After accounting for restoration of 1991 reductions, the ORD budget request actually falls short of the 1981 level (using constant 1982 dollars - see Figure 1). At this rate, the goal of doubling ORD's buying power will be unachievable until well into the 21st century, if at all. With the mounting regional, national and global environmental problems which are indicated as serious threats to human health, welfare and the economy, EPA and the

Congress would be ill-advised to allow such disparities to continue.

3.2 Changes In Research Direction

The Subcommittee is pleased with the efforts ORD has made to implement certain recommendations in the Future Risk" and "Reducing Risk" reports. ORD has, to varying extents, addressed the issues of pollution prevention, risk reduction, ecosystem effects, ecological monitoring and exposure. However, it has inadequately addressed the issues of epidemiologic research, training of environmental scientists, research in valuing natural resources and economic analyses. Clearly, the ability to address all of these recommendations adequately is hampered by the availability of funds, even with the increases in the media programs mentioned below. (Figure 2).

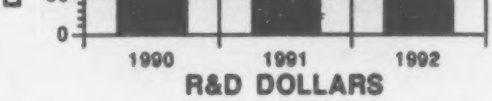
Figure 2



3.3 Infrastructure

Though S&E funding increased by 6.6% (to total $108.9 million), it was not adequate to cover capital personnel compensation and benefits for the additional FTEs requested. Congressional authorization to utilize R & D funds for equipment allowed ORD to implement a scientific equipment modernization program and the Subcommittee is pleased that its recommendations have contributed to this progress. Still, we feel concerned and disappointed at the rate of progress in this area and encourage additional funding .

Figure 3



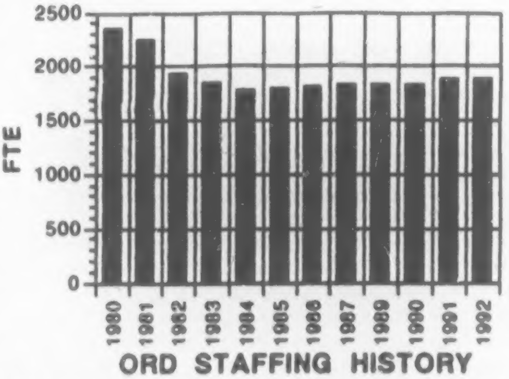
The $3.8 million increase requested for replacement of obsolete equipment raises total resources in this area from $9.3 million to $13.0 million. The schedule recommended by the Budget Review Subcommittee in the 1990-91 review was $26 million per year over a five year period assuming constant dollars. At this year's rate of expenditure (Figure 3), based on a 7 year turnover of equipment, the time necessary to achieve the goal of state-of-the-art equipment readiness would be tripled to approximately 15 years (assuming no change in the Consumer Price Index).

3.4 Staffing

The Office of Research and Development continues its parallel advancement system for its scientists and administrators. Vacant Senior Executive Service (SES) positions and Senior Scientist positions continue to be filled, undoubtedly increasing ORD's scientific productivity. The Science Advisory Board encourages the Office of Research and Development to continue its progress in these efforts.

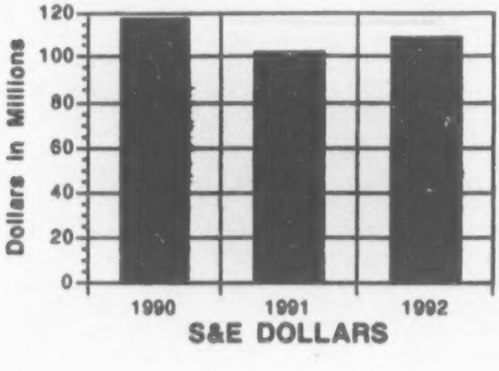
An increase of 43 full time equivalents (FTEs) from 1891.1 to 1934.1 (Figure 4) is requested in the 1992 ORD budget. This continues a slow upward trend which started in 1984. The Board is extremely concerned that this is becoming a trend which could force the Agency to lapse vitally needed FTEs due to insufficient S&E coverage (see Figure 5 - below).

Figure 4



As indicated in our review of the 1991 budget request, the workforce study conducted by ORD cited an ageing work force, the result of previous hiring freezes and reductions in force during the period 1980 to 1984 as contributing to difficulties in maintaining in-house capabilities. Unfortunately, there is little evidence that much has changed during the past year. The critical need to fill positions with young, dynamic scientists is exacerbated by an inadequate source of graduating environmental scientists and engineers.

Figure 5



In 1992, ORD has budgeted $1 million for the support of minority fellows as well as $0.4 million for training in math and sciences. While this addresses the problem with minorities, it falls far short of training environmental scientists at institutions with strong environmental research programs. As last year, we strongly urge EPA and Congress to develop a program of support which will encourage students to enter graduate environmental science and engineering programs.

With regard to the existing workforce, we note once again with concern that EPA spends only $240 per year per scientist for professional development. This remains far short of the $1000 to $2000 that private industry spends to maintain their workforces' scientific excellence. Since scientists must meet with their peers (in workshops or formal classroom sessions) to remain at the cutting edge of their science, we once again recommend that EPA implement a professional development program.

3.5 Research Planning

The Office of Research and Development has evolved a viable research planning system based on media-based research committees. Each committee, consisting of representatives from ORD and the relevant program offices within EPA, has the responsibility for recognizing the scientific questions involved with the variety of environmental issues facing the Agency and placing those questions in some order of priority contingent upon the funds available. Priorities among the research committees are, presumably, set by the Research Strategies Committee which includes the Deputy Assistant Administrators for all the program offices within the Agency. Final decisions on priority are made by the Assistant Administrator for R & D.

When cuts are mandated from either the Congress or the Executive Branch, the same Committees responsible for program planning are employed to distribute the cuts in such a way that minimizes program impairment in the judgement of those distributing the cuts. For example, the 1991 Appropriation subjected ORD to a mandated cut of some $24 million which was distributed over some 38 funded programs. In implementing this cut, only one small $300 thousand program was totally eliminated. However, with the deficit growing and other cuts to the annual appropriations likely, research planning becomes more and more difficult.

The Board understands the unique position held by legislators. All representatives have responsibilities to their constituents and often those constituencies' regional needs prompt the ear-marking of funds for special projects which might be vital to particular areas. However, in 1991, an $18 million block of funds was diverted to tightly pinpointed studies with only $5.8 million additional funding. Given the severe consequences of such actions, we strongly recommend that when funds are earmarked for special programs that additional monies be appropriated to accommodate them.

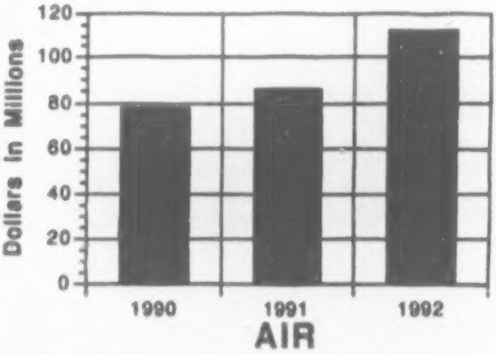
4.0 Media Programs

We are generally pleased with the approach ORD has taken in supporting projects in the various program areas, and the recommendations of the of the Science Advisory Board. Emphases have been rationally placed and disinvestments and reallocations have been appropriately applied. However, as with any complex program with limited funding, we have identified areas in which the resource dispositions can and should be challenged. Each medium is addressed below.

4.1 Air

The Air program receives a 39% increase in the proposed budget for a total of $112.4 million.(Figure 6). The monies are primarily distributed to meet the requirements of the Clean Air Act, global climate change, indoor air,electromagnetic radiation and air health. With respect to specific pollutants, the Subcommittee agrees that ozone effects research is a high priority. However, ORD needs to reorient its efforts to stress the effects of chronic exposure to a greater extent (this recommendation has been made in the "Reducing Risk" report and is reiterated here).

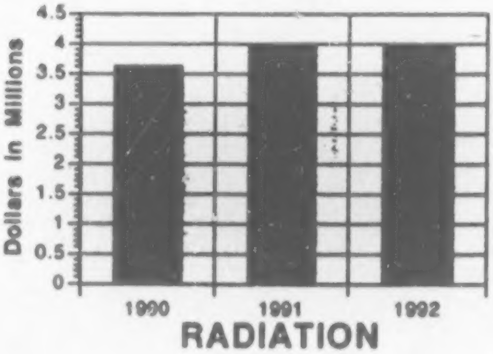
Figure 6



It is also agreed that air toxics work is an important research area, but of the 189 air toxics mandated in the CAA, only a relatively small number have sufficient information with which to establish criteria documents. A relatively large number of those toxics pose a relatively small risk compared to pollutants such as ozone.. Consequently, ORD should reexamine the priorities for funding within the air program.

Exposure research is a cross cutting issue which is relevant not only to the air program and humans but to all other media and ecosystems. Cross-cutting efforts such as these should be carefully planned and coordinated to preclude overlap and maximize the utility of resources.

Figure 7



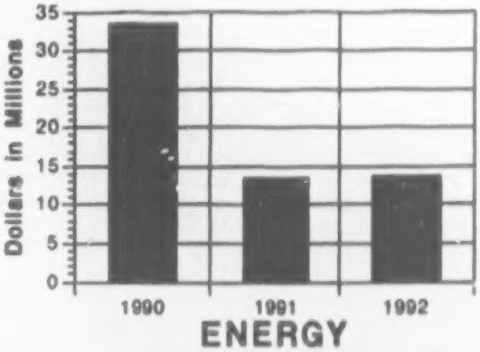
4.2 Radiation

The radiation program request totals $4 million, reflecting level funding with the 1991 budget (Figure7). The research component focuses on determining exposure to and effects of radon and electromagnetic radiation (EMR). EMR exposure is widely occurring in the U.S. and could, potentially, put our population at risk. Consequently, the SAB's Radiation Advisory Committee (RAC) recommends increased funding for this and radon research.

4.3 Energy

Energy research funding remains static for 1992 (Figure 8) at a level of$13.7 million. It addresses two major areas of research: acid precipitation [which is coordinated through an interagency task force of the National Acid Precipitation Assessment Program (NAPAP)] and the development and testing of the limestone injection multistage burner (LIMB) in cooperation with the Department of Energy.

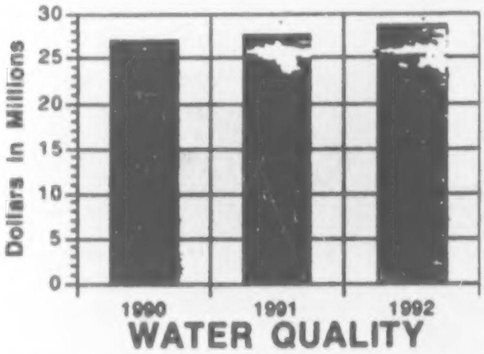
Figure 8



4.4 Water Quality

Water quality research support increases from $27.7 to $28.6 million (4%) in FY 1992 (Figure 9) with the funds going primarily to Great Lakes research, wetlands, wellhead protection and Midwest Agriculture Subsurface Transport Research (MASTER) . The Great Lakes research is of long-standing national and international importance. This program is an excellent example of cooperation among EPA program offices, regions, the states and foreign governments. It is an important component of the Environmental Monitoring Analysis Program (EMAP) and as such provides a strong retrospective data set upon which monitoring protocols can be developed. The lakes also provide an excellent outdoor laboratory for sediment toxicity work. The zebra mussel work conducted in this program is a congressional add-on that has become a high priority issue for the Great Lakes. As mentioned earlier, this program also contains an increase for MASTER, a program in which EPA cooperates closely with USDA and the USGS in researching the fate of agricultural chemicals in ground water as well as methods for their control and prevention.

Figure 9

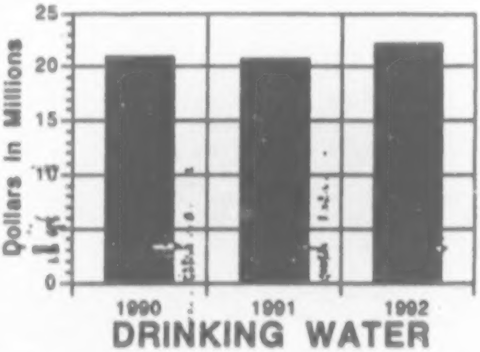


While the new activities are viewed favorably by the SAB, the concurrent decrease in the waste water treatment technology area is of great concern. The waste water treatment technology research program was cut by nearly one half in 1991 due to the reductions in the 1991 appropriation. This $2 million was not been restored in 1992, resulting in the loss of critical research on toxics treatability. The pollution prevention strategy, strongly endorsed by the administrator, is targeting selected toxicants that industry must remove by 50% within a specified time frame. Many of these toxicants find their way into waste water streams. Unlike conventional pollutants, the full impact of these toxic materials can only be determined by sophisticated bioassay procedures. Also, unlike the conventional pollutants which have been studied for some time, little is yet known about the effectiveness of common waste treatment processes in removing these toxicants. Without such work, the overall pollution prevention strategy will be weakened. And, although industry will seek to prevent the discharge of such toxicants, funds must be made available to ensure their identification.

4.5 Drinking Water

The drinking water program receives a 7% increase (for a total of $22.2 million) in the proposed budget (Figure 10), primarily for gathering health assessment information, evaluating analytical procedures to monitor drinking water and performing research on the protection of underground drinking water. Conversely, the SAB Drinking Water Committee has expressed concerns about continuing reductions in research on disinfectant by-products at a time when water treatment facilities are laboring with mitigation problems concerning disinfection by-products and selection of alternative disinfectants to reduce undesirable by-products. The impending promulgation of the disinfectant by products rule will, thus, be weakened by lack of information regarding these by-products. The SAB strongly recommends that this effort be supported at increased levels.

Figure 9

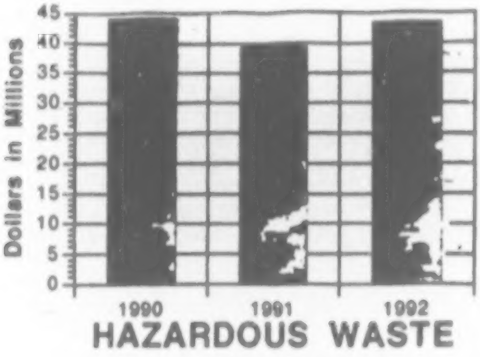


4.6 Hazardous Waste and LUST

Hazardous waste is increased from $39.2 million to $43.4 million for an increase of 10% (Figure 11). Research is directed toward bioremediation as a tool for hazardous waste disposal, health effects of incineration and municipal solid waste, oil spill cleanup (transferred from Superfund), and aquifer restoration (with emphasis on the effectiveness of chemical and biological processes for cleaning up beaches and shorelines). Considerable effort will also be expended on technology transfer activities. Pollution prevention activity is also receiving considerable attention as is risk assessment in both human and ecosystem health areas. The program is generally well-balanced and the Subcommittee supports the directions which it is taking.

The total for the LUST program remains constant from 1991 to 1992 at $0.8 million.

Figure 11

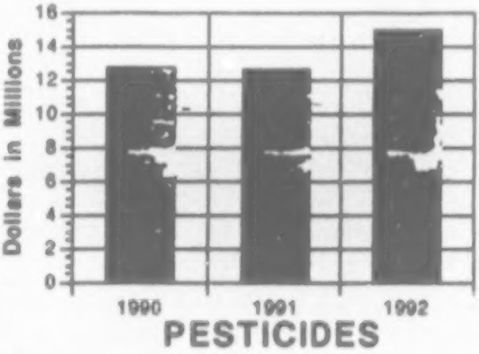


4.7 Pesticides

The Pesticides program request reflects an increase of $2.3 million to $14.9 million (an increase of 18%) in its budget (Figure 12). New emphases include research on neurotoxicolgy, reproductive toxicology, and exposure assessment.

The Pesticides program and the Toxic Substances program are closely related in that much of the research conducted is similar (in fact, often conducted by the same scientists). The Subcommittee is disappointed to note that these two programs suffered a $3.9 million cut in the 1991 budget with $1.6 million reduction in the biotechnology area. The 1992 budget provides for an increase of only $2.9 million for the two programs, which results in an overall reduction in support. For example, ecological risk assessment in both programs is identified as an area slated for increase. However, both programs were subjected to reductions in the 1991 Appropriation by an equal amount. Consequently, the Subcommittee strongly recommends additional funding for these activities.

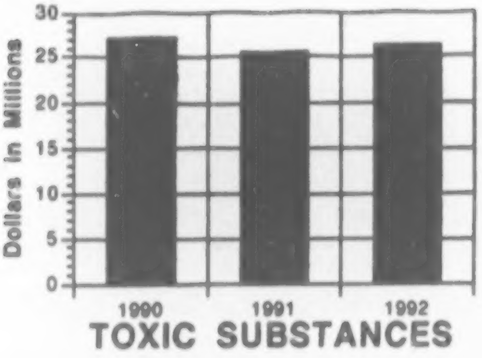
Figure 12



4.8 Toxic Substances

The Toxic Substances program is increased 5% from $25.5 million to $26.3 million (Figure 13). The increase is applied to initiating programs in neurotoxicology and exposure assessment. The work in this program is closely allied to that in Pesticides, and the Subcommittee again notes that the increases requested in both the pesticides and toxic substances programs do not restore the 1991 reductions. Thus, the net effect in this program is an overall reduction, which would result in base

Figure 13



program redirections to fund new starts.

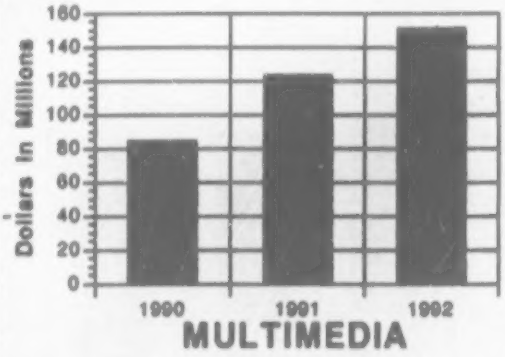
4.9 Multimedia

Multimedia research increases by $27.9 million (23%) to $151.1 million (Figure 14), with the increases going to a variety of activities including academic research centers, fellowships and traineeships, EMAP, scientific instrumentation, risk reduction, scientific outreach, arctic research and the extramural grants program.

Traineeship and fellowship programs are discussed in the overview section. The Subcommittee reiterates its support for the minority fellowship and the math and science education programs and again recommends that the Congress and EPA make an effort to initiate a graduate level environmental sciences and engineering traineeship/fellowship program patterned after the now defunct National Defense Education Act (NDEA) fellowship program.

The Academic Research Centers program was initiated 8 years ago with 8 centers in scientific areas in which the Agency lacked sufficient expertise to conduct its own research. These centers were very successful and productive and provided considerable guidance which was relevant to the Agency's needs. However, over the years, funding for the centers was not increased to keep pace with rising costs, but actually diminished in the face of considerable cost of living increases. Previously, the SAB had recommended that funding for each of the centers be increased from approximately $400 K to $2 million each so that they might operate more effectively. This year the centers the centers program will terminate the support of the 8 existing centers, and will select 4 centers to be funded at about $1 million each. The Subcommittee urges that centers be funded at this level and that this program suffer no further cuts. We also urge the expansion of the Centers program to allow funding of 8 Centers at a minimum of $1 million each.

Figure 14



The Subcommittee was pleased with the new flexibility of utilizing R&D funds for equipment shortages and modernization as well as for laboratory operating expenses. This spending authority can do much to make ORD laboratories premier facilities as well as foster better extramural programs.

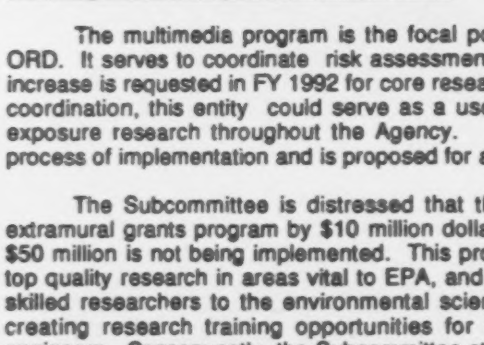
Participation in the federal high performance computing program (HPC) is also commended. With the geographic information systems aspect of EMAP, Great Lakes and Arctic programs, as well as global climate change research, we can expect a great demand for the computing capabilities available with HPC. The Subcommittee urges the Congress to strongly support this activity.

The multimedia program is the focal point for the core research program in ORD. It serves to coordinate risk assessment, reduction and uncertainty work. An increase is requested in FY 1992 for core research in the exposure area. With proper coordination, this entity could serve as a useful research management device for exposure research throughout the Agency. Finally, the EMAP program is in the process of implementation and is proposed for a $6.9 million increase.

The Subcommittee is distressed that the prior commitment to increase the extramural grants program by $10 million dollars per year until it reached a level of $50 million is not being implemented. This program has generated a high output of top quality research in areas vital to EPA, and provides a means of attracting highly skilled researchers to the environmental science and engineering area as well as creating research training opportunities for a new generation of scientists and engineers. Consequently, the Subcommittee strongly urges additional funding for the grants program in FY 1992 and beyond.

With the above exceptions, the committee is pleased with the directions and progress in the multimedia program. Its well designed components are important to the continued vitality of EPA's overall R&D efforts, and are strongly supported by the Board.

Figure 15



4.9 Superfund

The Superfund research program request ($68.6 million) reflects decreases of $5.0 million in FY 1992. The reduction (Figure 15) reflects 3 project terminations which were deemed appropriate for funding from other sources. The decrease also reflects a minor one-time reduction to the engineering site/situation assessment area, which will be of minimal impact.

5.0 CONCLUSIONS AND RECOMMENDATIONS

EPA's Research and Development progam houses formidable scientific capabilities —— many of which are unparalled elsewhere. However, given the growing complexity of environmental concerns, the rate of inflation, and the nonexistence of adeqaute pools of scientific talent, the future of the program is uncertain. Our citizens are extremely concerned about the quality of the environment and demand a strong response to preserve its health. However, without an adequate knowledge base upon which to act, the Agency will be unable to respond.

To a great extent, ORD has responded admirably to a myriad of environmental concerns facing our nation, and even the world. Still, it will continue to be incapable of providing an adequate response to environmental issues without a significant infusion of resources. Base programs (both core and non-core) must be shored up to prevent further erosion of the in-house capabilities. Extramural resources (including those for competitive grants and centers) must be increased in order to foster innovative and timely research by other leading researchers in the environmental research fields. Finally, serious attention must be paid to the aging equipmment and facilities of the organization through increases each year which are earmarked for these areas.

The concerns cited above provide a broad summary of our concerns about the R&D program. In addition to the essential support necessary in these general categories, we also wish to reiterate several recommendations mentioned earlier concerning specific items in the 1992 request:

1) Studies which stress the effects of chronic exposures to ozone should receive higher priority.

2) Exposure research should be more carefully planned and coordinated in order to maximize the use of resources and avoid overlap.

3) Research on exposure to and effects of radon and electromagnetic radiation should be expanded.

4) Decreases in the wastewater treatment technology area should be restored.

5) Research efforts on disinfectant by-products should not be reduced.

6) Efforts in ecological risk assessment and field validation in pesticides and toxics should be dramatically increased.

7) Funding for academic research centers and competitive grants should be doubled in order to provide funding for 8 centers and foster innovative research.

[Whereupon, at 11:32 a.m., the subcommittee adjourned, to reconvene at the call of the Chair.]

APPENDIXES

GEORGE E. BROWN, Jr., California, CHAIRMAN

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Republican Chief of Staff

March 22, 1991

The Honorable William K. Reilly
Administrator
Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Dear Mr. Reilly:

On March 12, 1991, the Subcommittee on Environment held a budget authorization hearing for EPA's Office of Research and Development (ORD). Mr. Erich Bretthauer, the Assistant Administrator for ORD, representatives of the Science Advisory Board and a former Assistant Administrator of ORD provided valuable testimony for the record. In addition to the ground covered during the hearing we have several follow-up questions that the Subcommittee would like to include in the official hearing record. Please be kind enough to provide the requested information by April 1, 1991.

A particular area of interest to the Subcommittee, and one that I know that you share, is the incorporation of standardized risk assessment methodologies into the regulatory decision-making process. I am concerned that activities conducted by the Risk Assessment Forum be funded and staffed equitably by all program offices as well as ORD. A commitment of staff and funding to the Forum by each of the program offices would go a long way towards increasing the level of awareness and the dedication to the development of standardized risk assessments throughout the Agency.

1) Over the past three fiscal years, what portion of the funding for the Risk Assessment Forum originated from ORD and each of the program offices?

2) What is the anticipated level of funding for the Risk Assessment Forum for FY 92, FY 93, and FY 94?

3) What procedures have been established to incorporate the recommendations of the Risk Assessment Forum into the regulatory decision-making process in a prompt and consistent manner?

The Honorable William K. Reilly
March 22, 1991
Page 2

Another area of great interest to our members is pollution prevention research at ORD and prevention activities throughout the Agency. Please provide a detailed accounting and description of activities currently under way both in ORD and throughout the Agency which address pollution prevention generally and source reduction specifically. Concerns were also raised by our members at the March 12 hearing on research efforts related to indoor air pollution and electromagnetic fields. We would appreciate detailed information which justifies the current (FY 92) levels of funding for research in these areas.

Thank you for your cooperation.

Sincerely,

JAMES H. SCHEUER, Chairman
Subcommittee on Environment

cc: Erich Bretthauer
Assistant Administrator/ORD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 25 1991

OFFICE OF CONGRESSIONAL
AND LEGISLATIVE AFFAIRS

Honorable James H. Scheuer
Chairman
Subcommittee on Environment
Committee on Science, Space,
and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This responds to your March 22, 1991 letter containing several questions concerning EPA programs as follow-up on your March 12, 1991 hearing. Our responses to each question are enclosed.

I apologize for the delay in our response; we had hoped to have finalized our Pollution Prevention program report in time to be included in these responses, but review of the report has not yet been completed.

If I can be of further assistance, please let me know.

Sincerely,

Christopher P. Hoff

Christopher P. Hoff
Deputy Director
Legislative Analysis Division

Enclosure

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RISK ASSESSMENT FORUM

The Risk Assessment Forum is a standing committee of senior Agency scientists study generic risk assessment issues of Agency-wide interest. The resulting scientific analyses, guidelines, and recommendations are distributed to all EPA offices for use in conducting risk assessments in regulatory decision-making. Forum guidance is designed to directly influence the risk assessment process. The Forum's influence on regulatory decision-making, is based on risk assessment and on other information as called for in the statutes administered by EPA. Published Forum analyses are made available to the public as EPA reports.

QUESTION: Over the past three fiscal years, what portion of the funding for the Risk Assessment Forum originated from ORD and each of the program offices.

ANSWER: Currently, the Forum agenda includes approximately twenty scientific projects, involving approximately 150 Agency scientists and an equal number of non-EPA scientists as consultants and peer reviewers. Resources to fund these activities can be described in three general categories.

- Forum Staff: The Forum is supported by the Forum staff, a small group of experienced scientists and three administrative support personnel. The Office of Research and Development funds the entire costs for this staff, including personnel compensation, benefits, travel, office space and equipment, supplies and comparable costs.

FY 91:	9 FTE & $434.5K (All ORD)
FY 90:	5.9 FTE & $363.3K (Actuals - All ORD)
FY 89:	5.3 FTE & $335.5K (Actuals - All ORD)

- Forum Members: The 18 Forum members, along with regular participants from Agency offices not represented in the Forum membership, work for five other EPA offices, including 10 members from the Office of Research and Development. In addition, more than 130 Agency scientists are working on various projects. Each of these participants works for another office and each is responsible primarily to his own office, which pays all of the member's cost. However, each participant contributes from 5% to 30% of his or her time to Forum activities. Also, for some special projects, some members give as much as 100% for certain periods of time. These costs do not appear in the Forum's budget and because they are highly variable from office to office and from time to time, a cost estimate is very difficult to estimate.

FY 91 TOTAL FTE: Possibly 6-10
FY 90 TOTAL FTE: Possibly 2-6
FY 89 TOTAL FTE: Possibly 2-4

- Extramural Budget: The Forum's extramural budget is used to fund scientific analyses and document development by scientific experts, public workshops, training programs, peer reviews, and analysis of public comments on published Forum proposals. These funds come from ORD and from other EPA program offices.

FY 91 from ORD:	$637.6K
FY 91 other EPA offices:	$210.0K
FY 90 from ORD:	$182.4K
FY 90 from other EPA offices:	$ 25.0K
FY 89 from ORD:	$142.6K
FY 89 from other EPA offices:	$140.0K

The basic funding questions relate not to adequacy, but to regularity of funding from offices other than ORD. Since the Forum was first funded in 1985, the ORD contribution has been planned as an integral part of the ORD budget process. During the first year or two, ORD as a sole source was fully adequate. As Forum activities have expanded, other Agency offices have responded fully when asked to contribute on a case by case basis to identified Forum activities. However, there has been no established mechanism for making these contributions a regular part of the budget in other offices.

RISK ASSESSMENT FORUM

QUESTION: What is the anticipated level of funding for the Risk Assessment Forum for FY 92, FY 93, and FY 94?

ANSWER: Anticipated funding for the next three fiscal years is set forth below:

FY 92 from ORD:	$137.6K R&D; $589.6K S&E; 9 FTE
FY 92 Other:	Not established
FY 93 from ORD:	Not yet planned
FY 93 other:	Not yet planned
FY 94 from ORD:	Not yet planned
FY 94 other:	Not yet planned

RISK ASSESSMENT FORUM

QUESTION: What procedures have been established to incorporate the recommendations of the Risk Assessment Forum into the regulatory decision-making process in a prompt and consistent manner?

ANSWER: Forum analyses are used in EPA risk assessments. EPA's risk assessment guidelines are developed under Risk Assessment Forum auspices and, along with other Forum analyses, are submitted to EPA's Risk Assessment Council (RAC) for decision on the use of Forum analyses as Agency-wide policy. Once approved by the RAC, the guidance is then distributed to all EPA offices.

TITLE: Pollution Prevention Overview

RESOURCES:

	FY 1990 Actuals	FY 1991 Current Est.	FY 1992 Request	Delta 1991 vs. 1992
FTE	12.2	17.0	13.0	+ (4.0)
S&E ($K)	748.1	926.7	1,082.3	+ 155.6
R&D ($K)	5,167.6	8,445.1	9,795.1	+1,350.0
TOTAL	5,915.7	9,371.8	10,877.4	+1,505.6

NOTE: In addition to the above there is $1,006.3 in the Superfund appropriation for research conducted at a Hazardous Substances Research Center for conducting research in source reduction through a variety of Projects.

QUESTION: Pollution prevention work is conducted in several areas of your budget, what work are you conducting in each area?

ANSWER: ORD Pollution Prevention research is conducted in three areas: 1) The Administrator's Two Percent Pollution Prevention Fund, 2) Hazardous Waste, and 3) Core Risk Reduction.

1. ORD's Share of Administrator's Two Percent Pollution Prevention Fund Program - EPA is participating in 11 projects

FY 90 Program did not exist
FY 91 Total of ORD Involvement in Projects = $3145.1 R&D
FY 92 Total of ORD Involvement in Projects = $3145.1 R&D

1) Pollution Prevention Research and Demonstration Proposal
2) Sustainable Agriculture Initiative
3) University Based Prevention Centers
4) Demonstration of Emerging Area Source Prevention Options
5) Chesapeake Bay Pesticide Index and Registry
6) Lead Pollution Prevention
7) Prevention of Groundwater Contaminations from Pesticides: Information Systems for States
8) Pollution Prevention for Small and Medium Industrial Operations and Municipalities
9) Reducing Lead in Drinking Water
10) Reduce Mobile Source Emissions Through Alternative Fuels
11) Reduction of Pesticides Applications Through Bioregulation

2. Hazardous Waste Research Activities:

FY 1990:	12.2 FTE	2206.8 R&D	2954.9 Total
FY 1991:	12.0 FTE	2400.0 R&D	3072.0 Total
FY 1992:	15.0 FTE	2400.0 R&D	3225.9 Total

In FY 1991, ORD is developing and demonstrating low and non-waste production technologies, evaluating environmentally friendly products, enhancing recycling through product design, and initiating long-term projects to determine pollution prevention possibilities for new processes and products. Work continues to encourage waste minimization assessments as a means of preventing pollution. Waste Reduction Innovative Technology Evaluation demonstration projects are conducted.

In FY 1992, research activities will continue to encourage the development, demonstration, and adoption of pollution prevention techniques and technologies which will emphasize low and non-waste production technologies, environmentally friendly products, and product design to enhance recycling. The program will expand from industrial waste streams to include energy, agriculture, and utility waste stream reduction. Results of Waste Reduction Innovative Technology Evaluation case studies will be published.

3. Multimedia Activities:

	FTE	R&D	Total
FY 90	0	2960.8	2960.8
FY 91	5.0	2900.0	3154.7
FY 92	1.0	4250.0	4506.4

In FY 1991, ORD began to broaden the existing hazardous waste minimization program to a comprehensive program of pollution prevention that has a multi-media focus and addresses both hazardous and non-hazardous pollutants.

The research in this area builds on existing knowledge, programs, and research by providing structured research programs for gathering and evaluating data on major topics of concern. The research includes the following program areas: product research, process research, socioeconomic and institutional research and technology transfer.

A start up level of research is being conducted on improved non-technological (socio-economic) information and communication, as part of an Agency-wide program on Environmental Implementation being coordinated by the Office of Policy Planning and Evaluation.

In FY 1992, technical research in the product, and anticipatory areas in source reduction will be expanded and non-technical socioeconomic research will continue. Technology transfer activities from both these areas will accommodate these areas. Global commitment to pollution prevention concepts in industry will rely on the information databases conveyed by the PPIC/PIES network. Expansion of existing databases on state and local programs, expert contacts, legislation, and case studies will begin with new entries from local governments and industry. Research will be continued on improved non-technological (socio-economic) information and communication, as coordinated by OPPE.

4. Superfund Activities:

	FTE	Extramural	Total
FY 1991	.2	988.3	1,006.3
FY 1992	.2	988.3	1,006.3

Research is conducted at Hazardous Waste Research Center on source reduction through a variety of projects. For example, research to determeine whether efficient gas-phase processes, such as ultraviolet/ozone cleaning, may supplant conventional solvent-based techniques, is being pursued. This would eliminate a major portion of the objectional waste generated by the microelectronics industry.

POLLUTION PREVENTION

QUESTION: Please provide a detailed accounting and description of activities currently under way both in ORD and throughout the Agency which address pollution prevention generally and source reduction specifically.

ANSWER: An EPA report on our Pollution Prevention program is currently undergoing review. We will provide it to you as soon as it is published, and will keep you advised of its status until then.

INDOOR AIR POLLUTION

QUESTION: Concerns were raised by our members at the March 12 hearing on research efforts related to indoor air pollution. We would appreciate detailed information which justifies the current (FY 1992) levels of funding for research in these areas.

ANSWER: Attached for the record is a copy of the Indoor Air Research Program Five-Year Plan (FY 1991-FY 1995). We believe that this information justifies the FY 1992 requested resources.

INDOOR AIR RESEARCH PROGRAM
FIVE-YEAR PLAN
(FY91-FY95)

INDOOR AIR RESEARCH PROGRAM
FIVE-YEAR PLAN
(FY91-FY95)

I. CURRENT PROGRAM PLAN

A. WHAT RESEARCH QUESTIONS ARE WE TRYING TO ANSWER?

Title IV of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires the Environmental Protection Agency to establish a research program with respect to radon gas and indoor air quality and to disseminate information on indoor air quality problems and solutions.

In a 1989 report to Congress, EPA noted that indoor air research and policy programs have not sufficiently characterized indoor air quality problems and solutions to be able to determine health effects, appropriate mitigation recommendations, or the need for possible regulatory actions. EPA made six recommendations to develop the necessary information to make such determinations. These recommendations are listed below and represent the primary objectives, activity, and support areas of EPA's Indoor Air Research Program for the next five years.

1. Research to better characterize exposure and health effects of chemical contaminants and pollutant mixtures commonly found indoors should be significantly expanded.

2. A research program to characterize and develop mitigation strategies for biological contaminants in indoor air should be developed.

3. Research to identify and characterize significant indoor air pollution sources and to evaluate appropriate mitigation strategies should be significantly expanded.

4. A program is needed to develop and promote, in conjunction with appropriate private sector organizations, guidelines covering ventilation, as well as other building design, operation, and maintenance practices for ensuring that indoor air quality is protective of public health.

5. A program of technical assistance and information dissemination, similar in scope to the Agency's radon program, is needed to inform the public about risks and mitigation strategies, and to assist state and local governments and the private sector in solving indoor air quality problems. Such a program should include an indoor air quality clearinghouse.

6. **The Federal government should undertake an effort to characterize the nature and pervasiveness of the health impacts associated with indoor air quality problems in commercial and public buildings, schools, health care facilities, and residences; and develop and promote recommended guidelines for diagnosing and controlling such problems.**

B. WHAT NEED ARE WE RESPONDING TO?

The following summarizes planned indoor air research that will address the recommendations identified above. For all this research to be accomplished in 5 years, an annual program funding level of $8.5M is necessary.

Program Need No. 1: Characterize Exposure and Health Effects of Chemical Contaminants and Pollutant Mixtures Commonly Found Indoors

New and improved monitoring and analytical methods will be developed in support of the Indoor Air Program. Emphasis will be placed on air exchange rate, environmental tobacco smoke, volatile and semi-volatile organic compounds, and bioaerosol techniques. Monitoring methods development will be directed to developing new microenvironmental, personal exposure, and passive techniques. Integrated samplers capable of screening multiple pollutants will also be designed and evaluated. The monitor designs will stress low resource requirements, high species selectivity, high collection efficiencies, and high reproducibility.

New analytical methods will be developed for the collection, extraction, and analysis of each specie listed above. In addition, continued emphasis will be placed on the analysis of polar volatile and semi-volatile organic compounds because these substances are associated with the highly toxic sample fractions. Components of environmental tobacco smoke and probable tracer gas analyses will also be examined. Analytical methods development research will stress improved sensitivity, reproducibility, and selectivity, with minimum cost.

Human clinical exposure studies will be performed to identify behavioral, physiological, neurophysiological, inflammatory and allergic responses which characterize health effects of indoor air pollution. The comparative irritancy and thresholds of individual or mixtures of real-world indoor air pollution products (as determined by AEERL and AREAL) will be studied. A major focus will be to identify and characterize individuals or populations sensitive to indoor air pollution. These data will allow the Agency to predict and to validate human responses to common indoor air pollutants in order to mitigate and to prevent sick building syndrome.

Health assessment methodologies will continue to be developed for multiple pollutants (mixtures) and non-cancer endpoints. Assessments will be conducted for sources and mixtures identified by the health and sources evaluation programs. Example assessments might be for carpet, kerosene heaters, or specific compounds such as 1,3 Butadiene.

The primary objective of EPA's source assessment is to identify the various compounds emitted from products used indoors and to estimate concentrations to which humans are exposed. Research will continue to develop methodologies for source testing. EPA's indoor air models will be continuously improved to realistically evaluate human exposures.

Beginning in FY92, EPA's TEAM program will assume responsibility for the development of all monitoring and analytical methods noted above.

Program Need 2: Characterize and Develop Mitigation Strategies for biological contaminants.

Contingent upon an annual funding level of $2M, the following is planned for biological assessment and control.

A formal health assessment of biocontaminants found indoors will begin in FY91. The assessment will address the sources and species of biocontaminants found indoors; evaluate the transport and fate of these contaminants; and describe known health effects. Where possible, mitigation principles will be recommended.

In FY91 the monitoring program will begin to plan and implement a program for the detection and identification of biocontaminants found indoors. This will be an integral part of the building studies program. During the period FY92-95, protocols for monitoring biocontaminants will be developed and made a part of EPA's compendium of indoor air sampling methods.

In FY93, evaluation of the growth and control of biocontaminants will become an integral part of EPA's mitigation research program. The objective of the research will be to understand the effect of environmental and source conditions on biocontaminants growth and viability on indoor materials especially those found in ventilation and air handling systems. One additional purpose of the research is to develop ASTM or ASHRAE standard methods for testing performance of air cleaners in reducing biocontaminant exposures especially in such environments as schools, medical facilities, and large offices.

Program Need 3: Characterize Significant Indoor Air Pollution Sources and Evaluate Appropriate Mitigation Strategies.

The Indoor Air Health Research Program will emphasize the effects of VOC mixtures on neurobehavioral and physiologic effects in humans and the establishment of an animal inhalation exposure facility to assist in evaluating VOCs from indoor sources:

For VOCs and chemical mixtures, a more realistic, and sensitive line of research is necessary. The focus of the research is the hypersensitivity, neurotoxicity, and annoying properties of chemical mixtures.

In ETS research, emphasis will be on determining the distribution of constituents in the particulate and vapor phases of ETS and identifying and evaluating marker compounds for these two phases of ETS.

Efforts will continue to assess human response to mixtures. Biomarker research will continue to examine ways cotinine can be used to estimate exposure to ETS. Research efforts will be expanded to emphasize the non-cancer health effects using animal studies. Assessments of the genotoxicity of emissions from various indoor combustion appliances and associated mitigation strategies will be completed. Studies will better characterize human response to the complex emission components of indoor sources. The work will help to identify potential sources of health hazard for more detailed investigation.

Indoor source evaluations via small chamber testing will be continued to focus on widely used products that affect indoor air quality. Candidates for testing include: carpets, wall coverings, paints, waxes/polishes, caulks, adhesives and re-emitting sinks such as old carpets and ductwork liners from heating, ventilating and air conditioning (HVAC) systems. Expansion of source characterization research will include an in-depth evaluation of sensory irritation response in a cooperative project between EPA's Health Effects Research Laboratory and the Engineering Laboratory. Mathematical models of source emissions and "sink effects" will be developed. They will be incorporated into the IAQ model, which will be further enhanced by improving the user interface and increasing the speed of the solution algorithms. IAQ test house studies will focus on fast decaying, solvent based products (e.g., stains, varnishes, and waxes). This research will provide information useful to consumers on usage practices that will reduce exposure to solvent emissions. Research on air cleaners will focus on the development of appropriate testing methods for indoor particle filters. Cooperative work with ASHRAE and other private organizations will include development of methods for determining ventilation effectiveness. An international workshop in indoor source characterization will be conducted for the exchange of research results with worldwide experts. Technical support to EPA Program Offices will be provided as needed.

Program Need 4: Develop and Promote Guidelines Covering Ventilation as Well as Other Building Design, and Maintenance Practices for Ensuring That Indoor Air Quality is Protective of Public Health.

Prior to FY 1992, only limited research will have been conducted to support indoor air quality control and mitigation. An expanded research program will be directed to designing and evaluating control devices and mitigation strategies. Research on air cleaning devices will be expanded by: 1) developing and testing improved designs for particle air cleaners; 2) conducting R&D on new concepts for removing vapor-phase organics from indoor air; and 3) evaluating the cost-effectiveness of cleaning outdoor air used for ventilation, in situations where it doesn't meet NAAQS's (a major problem for meeting ASHRAE Standard 62 in some cities). This research will result in recommendations on air cleaners, ventilation strategies, and methods for modifying or treating indoor sources to reduce emissions.

Program Need 5: Information Dissemination.

The Indoor Air Monitoring and Building Studies Program will continue to emphasize monitoring and analytical methods development, building diagnostic and remediation methods, and technology transfer. Monitoring and analytical methods development research will include the development and evaluation of personal and microenvironmental monitors for SVOCs and polar organic compounds; and the development of quality assurance standards for compounds routinely measured indoors (e.g., nicotine and semi-volatile compounds). Research in building diagnostic and remediation methods will include the evaluation of indoor air quality data from large Federal buildings such as the Library of Congress and EPA/Waterside Mall buildings and the development and refinement of procedures to evaluate large building exposure assessment and indoor air quality problems. Technology transfer activities will include the publication of the compendium of indoor air quality measurement methods.

An expanded program will emphasize support of a major international technical conference on indoor air pollution, the publication of a series of technical reports on indoor air pollution, and increased support and broader technical assistance to OAR, Regional Offices, state and local governments. Emphasis will be given to the support of a national indoor air clearing house that would include a body of technical information.

Program Need 6: Indoor Air Quality Problems in Buildings.

EPA's capability to study buildings will be greatly expanded. The building study program will apply diagnostic procedures developed by the research program and will integrate the monitoring and health resources of the Agency in a coordinated effort to explain and evaluate environmental conditions and the status of health found indoors, especially in large buildings. Studies will be conducted that evaluate both normal and complaint buildings so as to better predict when and the type of health problems that will likely occur in the presence of a particular indoor air quality scenario. Studies will also begin that evaluate the productivity of office workers exposed to unhealthy indoor air. Efforts will begin with other Federal agencies to develop standardized methods for measuring biological contaminants. Procedures to investigate the contribution of HVAC equipment to indoor biological contaminant levels will be developed.

A formalized body of knowledge related to building science will be developed. The following will be initiated: investigation of potential sources and ventilation problems (preferably in Federally owned or leased office building(s) with occupant complaints); development of corrective actions; implementation of corrective actions and evaluation of results; and establishment of guidelines for problem building evaluations and corrective actions.

C. WHAT RESULTS DO WE ANTICIPATE?

To support the Agency's general goals and needs, EPA's Indoor Air Research Program is organized around the following areas: Indoor Air Monitoring and Building Studies; Indoor Air Health Effects; Indoor Air Source Characterization and Mitigation; Biological Assessment; Indoor Air Health Impact and Risk Assessment; and Indoor Air Program Management and Technology Transfer.

Planned research outputs during the next five years in each of these areas is summarized below. These outputs assume a funding level of approximately $5.5M for a five-year period.

Building Diagnostics

a. Integrated protocols
b. Incorporation of physical examination, monitoring, analysis, and exposure protocols
c. Simultaneous collection of multiple pollutant, physical, and personal data

Large Building Studies

a. Collection of baseline data under multiple structure conditions, both complaint and noncomplaint
b. Assessing seasonal variations

Compendium

a. Abbreviated edition for technicians
b. Development of technical assistance document
c. Increased number of protocols and species monitored

Monitoring Methods

a. Integrated sampling systems requiring minimal resources
b. Biological methods development
c. Passive and screening devices

Analytical Methods

a. Development of routine methods for polar compounds
b. Characterization of collection, extraction, and analysis parameters

QA Standards

- Development of QA reference materials for indoor air studies with emphasis on nicotine, SVOCs, and VOCs

Modeling

- Incorporation of modeling into large building study designs and mitigation

Exposure Assessment

a. Development of standard survey instruments
b. Development of standard activity logs

Source Evaluation

a. Developing information on "clean" materials and products
    - Product testing for chemical emissions
    - Response-based testing with animals or humans
    - Marketplace involvement (manufacturers, buyers)
b. Understanding the role of pollutant "sinks"
    - Effect on short- and long-term exposures
    - Relationship to conditioned responses by occupants

Mitigation & Control

a. Evaluating air cleaners
    - Test methods
    - Performance data: particles, biocontaminants, gases
    - Marketplace involvement
b. Developing design information on effective ventilation
    - Location of supply and return air registers
    - IAQ modeling to relate indoor sources to HVAC design
c. Evaluating source management options
    - Product use practices
    - Material conditioning
    - IAQ modeling to evaluate exposure reductions
d. Evaluating biocontaminant-specific control options
    - Humidity control systems

  - Biocides
- e. Evaluating sources and IAQ controls in the field
  - Demonstrate IAQ model in occupied buildings
  - Diagnose buildings for contaminant sources
  - Demonstrate IAQ control in occupied buildings

Human Studies

a. Chemical sensitivity evaluation, including dose effects
b. Realistic exposure concentrations related to widely used sources
c. Non-cancer endpoints

Animal Studies

a. Source evaluation procedures
b. Irritation to upper airway passages

Biomarkers

a. For exposure other than ETS
b. Mutagens in indoor air

Risk Assessment Methodology

a. Multiple pollutants (mixtures)
b. Non-cancer effects
c. Simulation models - PC based

Assessments

a. Biocontaminants
b. Public buildings - chemical reactions and upper respiratory disease
c. Toxic indoor air contaminants - pollutant specific contributions to chemical sensitivity

Program Support

a. Indoor air clearing house - technical information
b. Specialty indoor air research workshops (control methods, source assessment, assessment of biocontaminants)

D. WHAT IS NOT BEING DONE IN FY91, FY92?

The following summarizes research activities that cannot be accomplished at all or to a satisfactory degree in FY91 and FY92 because of limited funding. All of these research needs are necessary for successful implementation of Title IV of Superfund.

- **Indoor Air Source Characterization and Mitigation (FY91)**
  - Emission factor database for sources
  - Ventilation studies
  - Source management research (chemicals, particles, biocontaminants)
  - Air cleaning research

- **Indoor Air Building Studies and Methods Development (FY91)**
  - Building diagnostic protocols
  - Large building investigations
  - Indoor air models for large buildings
  - Compendium of indoor air sampling methods
  - Methods development (analytical, sampling)

- **Biocontamination Assessment and Control (FY91, FY92)**
  - Biocontamination identification methods
  - Biocontamination control methods

- **Indoor Air Health Effects (FY92)**
  - Human response and sensitivity to VOC exposures

- **Indoor Air Health Impact and Risk Assessment (FY91)**
  - Risk assessment methodology development for multiple pollutants, non-cancer endpoints
  - Assessment of risks for common indoor air exposure scenarios

- **Indoor Air Research Program Management and Technology Transfer (FY92)**
  - Indoor Air Research Program planning and coordination
  - Support of indoor air symposiums and conferences
  - Technical assistance to industry
  - Special research projects

- Effects of cleaning activities on indoor air
- "Screening and methods" testing
- University research projects
  - Program planning for bio-aerosols research

II. STRATEGIC QUESTIONS

A. ISSUES

Since 1986, EPA has attempted to put in place an indoor air research program to comply with the mandates of Title IV of Superfund. The strategy has been to approach indoor air research on a broad front, with an integrated program that takes full advantage of various disciplines found in six ORD labs, the indoor air research community at large, and private industry. The overall objective has been to collect the type of data that would lead to a realistic assessment of human exposures to indoor air contaminants and associated health risks. Once human exposures and health risks were determined, an appropriate level of mitigation, based upon hard research data, would then be recommended. The major research areas constituting the program and their interrelationships are summarized in attached Figure 1. That research plan was developed based on the assumption that although the Indoor Air Research Program has been previously badly underfunded, it was to grow significantly in FY91 and FY92--per ARRC and AA/ORD budget submittals for $4.4M in FY91 and $5.4M in FY92.

Early in FY91, EPA's Indoor Air Research Program was reduced from a R&D funding level of $4.4M to $2.8M. This unexpected cut had a devastating effect on the Agency's ability to conduct a coherent integrated Indoor Air Research Program. The cut ruptures in a fatal way the Agency's ability to comply with the research mandates of Title IV of Superfund. It does not provide means by which research can adequately support EPA's overall program for indoor air as reported to Congress in 1989.

B. NEEDS

Critical mass funding is necessary in three areas: building studies, mitigation, and biopollutant research. The major unmet needs are summarized below.

1. Funding for building studies programs. No funding is currently available for the development of building investigation protocols and the evaluation and comparison of complaint and noncomplaint buildings. A fully funded building studies component should have an annual budget of no less than $2M.

2. Funding for mitigation research. Control methods research is currently not being conducted to any significant level. Ventilation strategies and designs, air cleaning, and source management research need a funding level of $2M.

3. Research in the area of air biopollutants is not being conducted. Airborne biological contamination represents a major indoor air exposure and health impact issue. Mortality and morbidity are clear endpoints of the exposure. Research in biocontaminants must be markedly expanded in areas of monitoring methods, biocontamination sampling, growth and disposal research, and mitigation studies.

C. RESEARCH QUESTIONS

Indoor air has always had "support in principle" from the Agency. Since the 1987 ARRC planning cycle, the ARRC Indoor Air Subcommittee has consistently indicated that the Agency's Indoor Air Research Program should be funded at an annual level of $7-10 million dollars for a 4-6 year period in order to achieve our research objectives. However, year after year ARRC found it necessary to make indoor air research "give way" to regulatory agendas and other high priority programs in the face of limited resources.

The most important question facing EPA indoor air research is, "What kind of research program does the Agency wish to have?" The current indoor air research strategy, which is based on determining health effects and estimating risks, will not achieve the intended objective with the currently projected funding levels. To preserve the current strategy without commitment of a funding level in excess of $8M for a series of years will not provide the public, in the long run, with adequate health/risk-based information on indoor air or control guidance. In addition, as EPA's Indoor Air Division continues to work with the public on indoor air issues, the Agency's Indoor Air Research Program will not have the necessary information with which to support them--especially in the areas of health effects, risk estimates, biopollutants, and mitigation guidance.

III. STRATEGIC ACTIVITIES

A. WHAT CHOICES DO WE NEED TO MAKE?

- Does the Agency wish a comprehensive health risk based research program as represented by Fig. 1 funded in excess of $8.5M per year for 3-5 years?
- Does the Agency wish a scaled back program emphasizing source control and exposure reduction funded at an annual level of $3-5M?

B. WHAT STEPS WILL WE TAKE?

In the face of limited research dollars, responsible management of resources dictates that EPA must change the outlook and strategies on indoor air research if anything significant is to be accomplished in one or more of the areas and in terms of the usefulness of program outputs to ameliorate a major public health problem.

With regard to the future of indoor air research, EPA has 3 options, as discussed below:

1. Support a fully funded program of approximately $8.5M per year for five years. A fully-funded Indoor Air Research Program for 3-5 years would be as follows:

Source Assessment	$1,000K
Control	2,000
Building Studies	2,000
Health Research	1,000
Biopollutants	2,000
Risk Assessment	500
	$8,500K

A program funded at this level will support the research needs presented by EPA to the Congress.

2. Pursue the currently planned Indoor Air Research Program on a broad format with reduced funding in all major research program areas. This would amount to no significant research output over the next 3-5 years in any major area. Health research would not be able to deliver useful dose-response information by which to conduct risk assessment, not to mention a complete absence of information on the multiple chemical sensitivity issues. Risk assessment methodologies would not be developed to use multiple pollutant data even if health data were available. Limited resources would not permit the start of ventilation, and air cleaning research, which also affects our ability to provide research-based guidance on source management. There would be an overall absence of research-based guidance on indoor air mitigation methods.

The area of bio-aerosol assessment and control at this time clearly needs research attention for the wide-scale protection of public health. Under this option we would have no resources by which to begin work in this very important area.

Large building investigations are expensive and in excess of a million dollars each, as we have learned in the Library of Congress and EPA building studies. EPA cannot afford, nor should the Agency plan similar investigations unless there is strong assurance that they can be properly funded through to their completion.

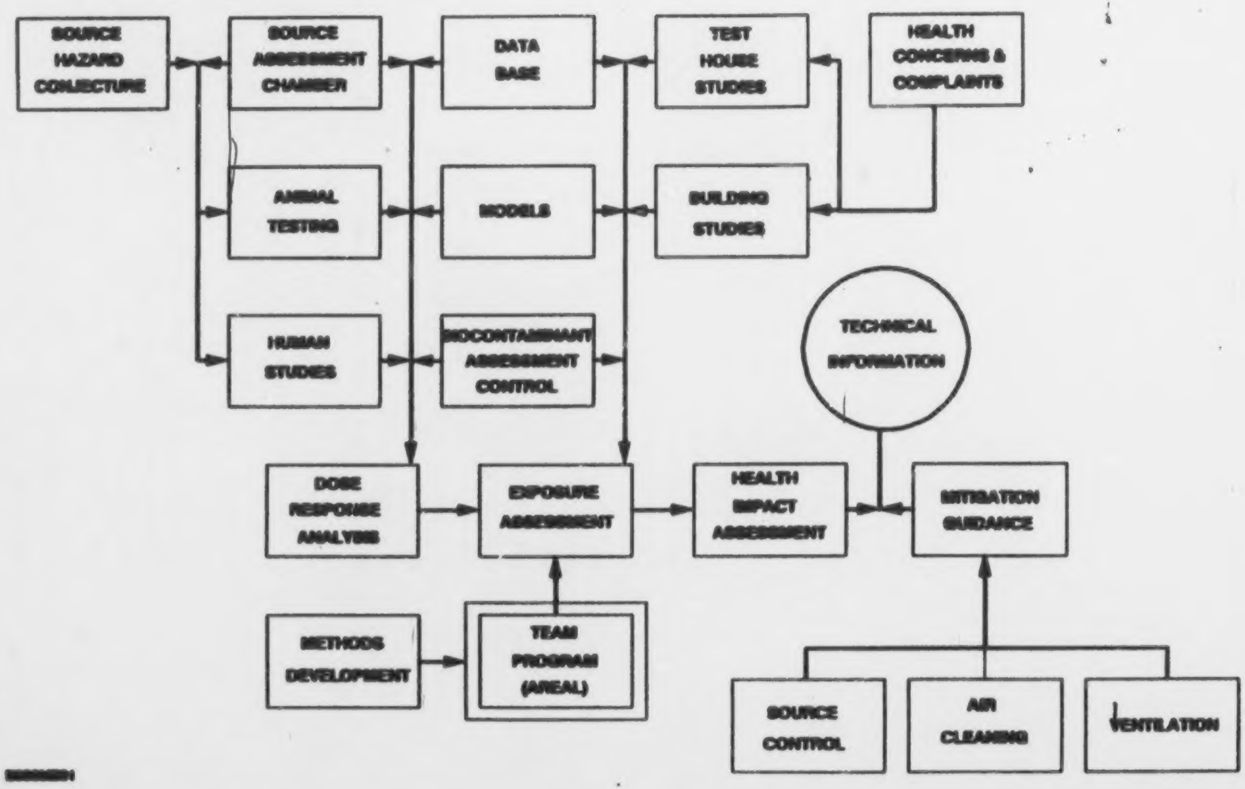
3. Redesign the Indoor Air Research Program to focus solely on the reduction of indoor air contaminants and human exposure to those contaminants. Contaminants would include VOC's, respirable particles, bio-aerosols, ETS, and carbon monoxide. This option would emphasize source assessment, mitigation guidance research, and building studies. All indoor air resources would be put into the research areas of source characterization, mitigation, building studies, and methods development. The objective under this option is to provide research results that would reduce human exposures. This option embraces EPA's pollution prevention philosophy. Under this option, for the purpose of maintaining an effective level of funding for reduction and exposure work, all health research and risk assessment work would be eliminated. Biocontaminant assessment would be absorbed by the source assessment activities. Management of these activities would reside in the laboratories doing the work and the current matrix management structure would be dissolved. Annual funding would be approximately $3M for source assessment and mitigation, and $2M for building studies and methods development.

C. WHAT REMAINS UNRESOLVED OR UNDONE?

Unless EPA can afford a health risk based program augmented with work in biocontaminants, while not taking away from source assessment, mitigation, and building studies research, the Agency should seriously consider option 3 as outlined in the previous section.

For research to be effective, critical mass funding must exist in major research areas for multiple years. For EPA's Indoor Air Research Program to deliver the health information that justifies mitigation guidance for the major indoor air pollution categories (biopollutants, VOC's, combustion products, etc.), base program funding must be in excess of $8.5M for multiple years.

FIGURE 1. EPA INDOOR AIR RESEARCH PROGRAM FRAMEWORK



ELECTROMAGNETIC FIELDS

QUESTION: Please provide detailed information which justifies the current (FY 92) level of funding for research on electromagnetic fields (EMF)?

ANSWER: Our FY 1992 budget request to support research on EMF is: 1 FTE, $60K S&E, and $875K R&D.

Electromagnetic fields occur in our environment from natural sources and from the generation, transmission and use of electric power. Since 1979 an increasing number of epidemiologic and laboratory studies have identified possible health effects associated with the extremely low frequency (60 Hz) electric and magnetic fields generated from our use of electric power. The range of possible effects identified include: cancer, reproductive, developmental, neurological, and immune system effects. Several recent review papers, including EPA's draft evaluation of the carcinogenicity of EMF, have served to highlight this area as a potential environmental problem.

ORD is preparing a document describing a national research plan for Electromagnetic Fields. The purpose of this document is to identify the research needed to determine the health risk from EMF exposure and how to effectively limit exposure to EMF if necessary. This document will include sections on health effects, exposure, and control technology. The health effects chapter will discuss human and laboratory studies needed to address concerns regarding cancer, neurological, reproductive and developmental effects, and immune system effects. This document will be used to help prioritize our research program and build a consensus on the most critical research areas.

Research on the possible health effects from exposure to EMF is currently being supported by various federal agencies (e.g., DOE, HHS, EPA), several states, and private research groups. In FY 1991 EPA is supporting the Health Effects Institute (HEI) to examine the research needs in this area and to develop a program which will result in a more accurate determination of the potential risks. We will continue to support the research program on EMF with HEI in FY 1992. We believe an institution, such as HEI, which receives both public and private support, and which is not involved in either the generation or regulation of electric power is the most effective and credible method of conducting research in this area.

March 20, 1991

HEALTH EFFECTS INSTITUTE

RESEARCH ON HEALTH EFFECTS OF ELECTRIC AND MAGNETIC FIELDS

INTRODUCTION

The Health Effects Institute (HEI) has been contacted by the Environmental Protection Agency (EPA) and several industry groups in response to public demand for information and answers to the questions that have been raised about the health effects of exposure to extremely low frequency electric and magnetic fields. The Institute has been asked by representatives of these groups to consider planning, developing and managing an independent research program on a national scale to study health effects of exposure to electric and magnetic fields (EMF).

In order for this program to be a success using the HEI model, it must have the resources that can be generated by a public/private partnership, as well as the support and involvement of all concerned. It needs the support of federal government departments, state regulatory agencies, labor organizations, consumer organizations and the private sector including utilities, computer manufacturers and manufacturers of electrical appliances and equipment.

Initially, funding would be provided by the EPA and the electric utilities. The resources could then be expanded by funds from other private sector sources (computer and electric appliance industries) and matching funds from other appropriate government agencies (Department of Defense, Department of Energy, Food and Drug Administration) and contributions from consumer and labor groups.

HEALTH EFFECTS INSTITUTE

The Health Effects Institute was established in 1980 to provide an independent source of credible scientific information to ease the adversarial atmosphere that existed between the manufacturers of motor vehicles and the Environmental Protection Agency, which had interpreted the Clean Air Act as putting the "burden of proof" on the manufacturers to detect and control the hazards of motor vehicle emissions. The organization that emerged from the deliberations among government and industry representatives was a new concept in government/industry cooperation; its 50-50 government-industry funding and distinguished board of directors gave the Institute its mandate for independence, which was essential for its credibility. The ten years of successful application of this model to important areas of environmental public health research provided the rationale for its use in examining the health effects issues surrounding exposure to extra low frequency electric magnetic fields.

The first step will be a feasibility study that was approved by the HEI Board of Directors early in December. In this study, scientific experts representing the critical areas of investigation will be assembled along with representatives of federal government departments and state agencies to examine the present research activities on EMF and to lay out a research plan for HEI that takes into account the ongoing research efforts and significant unmet needs. Additional input would be bought from the private sector sponsors. Upon completion of this feasibility study the Board will then make a formal decision to commit the Institute to a research program. It is expected that the planning step would be completed in the autumn of 1991 and that an EMF research committee would be named by the Board of Directors.

POTENTIAL SPONSORS

Environmental Protection Agency - The Agency has indicated a willingness to provide $525,000 in fiscal 1991 to support a research program jointly funded by the private sector. We expect that the Agency would name a person to act as a direct liaison for information to and from the Institute. In addition, it is expected that the Agency would establish an internal oversight group as a resource to the contact person in dealing with Agency concerns as it has for other HEI programs.

Other Federal Government Agencies - The Department of Defense (DOD), Department of Energy (DOE) and the Food and Drug

Administration (FDA) have all had active research programs on EMF examining different facets of the problem. In particular, the DOE has had funds to support research on EMF externally, and overtures are being made to DOE to explore the possibility of obtaining additional support for the EMF research work that would be organized and managed by HEI. Contacts with FDA and DOD will need to be initiated to determine their level of interest. In addition, the National Institute of Environmental Health Sciences and the National Institute for Occupational Safety and Health have either planned or ongoing research programs and interactions with these institutes would be established.

Electric Utilities - The potential sponsors among the electric utility industry come from several sectors of that industry. The expectation is that the Health Effects Institute would establish a relationship with each company or organization that becomes a participant in the program. Each company would designate a representative to be the contact person with Institute and be responsible for liaison with the company.

Large Public Power Council (LPCC)- The LPCC represents the 18 largest public power companies in the country and was the source of the initial private sector contacts with the Institute. A liaison person should be named to carry out the specific contacts with the Institute from LPCC.

Electric Power Research Institute (EPRI) - We anticipate that EPRI will also be a source of private sector funding for the research program. Since EPRI has been a major resource for research support for EMF health effects studies over the past several years, it will be necessary to communicate and share information between EPRI and HEI to avoid unnecessary duplication of research efforts and to gain the benefit of interaction among the investigators carrying out studies in this area. In addition to regular interactions between EPRI and HEI staff, there may be opportunities for collaborative efforts between the EPRI scientific advisory board and the HEI Research Committee as well as the possibility for jointly sponsoring relevant public scientific meetings.

Edison Electric Institute (EEI) - The Edison Electric Institute, representing the investor-owned electric power utilities, has also indicated an interest in the HEI research program. Suitable contacts with EEI will need to be established to determine the type of interaction and possible funding of the HEI research program.

Empire State Electric Energy Research Corporation (ESEERCO) - ESEERCO represents the major electric utilities in New York State. It also supports the HEI national EMF study concept and has expressed its interest in providing financial support.

Canadian Utilities - Representatives of Canadian electric utility companies have also expressed an interest in the program. Since significant amounts of electricity generated in Canada are transmitted to the United States, the joint interest in the program is suitable, and the association will be further explored.

National Electrical Manufacturers Association - The manufacturers of a wide range of electrical appliances that are present in most homes and which emit 60 hz magnetic and electrical fields have also expressed an interest in collaborating in the jointly sponsored research program.

Computer Industry - Segments of the computer manufacturing industry have indicated an interest in associating with the activities of the Health Effects Institute for a research program on EMF. There are some substantial differences between the concerns of this industry sector and the others who have a primary concern about 60 hz fields, and this difference of interests will have to be addressed effectively to carry out a single and harmonious program to the benefit of all sponsors.

Labor Unions - Several labor unions, including the Communications Workers of America and the International Brotherhood of Electrical Workers would have an interest in the research that will be carried out as it relates to occupational safety and health issues. Contacts with these organizations will be made to determine their level of interest and commitment to the program.

Public Interest Groups - It would be highly desirable to include public interest groups as part of the consortium. Their interest and activities in environmental public health areas makes them an appropriate partner in the program.

FUNDING

Overall, the Board of Directors of HEI is committed to a public/private matched funding scenario as the proper vehicle to maintain the independence of the activities of the Institute. Initially, it is expected that EPA and the electric power industry will each provide $525,000 to start the program. The plan is to have $3 million each from the private and public sectors each year for five years. It is also anticipated that the additional funds from both public and private sectors, to reach a total of $6 million for the first year could be available following the formal start of the Health Effects Institute EMF research program. The source of the public sector funds beyond the initial $550,000 from EPA has not been identified with certainty, but the DOD and DOE are likely sources to solicit. Additionally, the congressional initiative on regulation of EMF and establishing a research program could be a source for funding, possibly through EPA, and/or DOE, however, these funds would not be available until fiscal 1992.
The key issue will be to provide adequate support so that a research program can be mounted to address the issues of concern to the public and to allow regulators to make decisions based on a sound scientific basis. In an area that is filled with misconceptions and hyperbole of interpretation, the only acceptable

recourse is to obtain the relevant scientific information applicable to the problem. For the Institute a minimum of $3,000,000 per year from the public sector matched by private sector funds is required to develop a research effort that has any chance of making an impact on the understanding of possible health effects of electric and magnetic fields.

1633 Broadway
New York, New York 10019
212 468.6301

New York Power Authority

James M. Cunningham
Senior Vice President
Public Affairs

March 20, 1991

Honorable James H. Scheuer
Chairman
Natural Resources, Agriculture
Research and Environment Subcommittee
Science, Space and Technology Committee
H2-388 House Office Building Annex II
Washington, D.C. 20515

Dear Representative Scheuer:

On behalf of the New York Power Authority and the Large Public Power Council, I am submitting written comments on the proposed EMF national study program.

I respectfully request that these comments be made part of the March 12th 1991 hearing record of the Natural Resources, Agriculture Research and Environment Subcommittee hearing on the fiscal 1992 budget for the Environmental Protection Agency.

If you have any questions or comments, please contact me at 212-468-6301.

Thank you.

Sincerely,

1633 Broadway
New York, New York 10019
212 468.6000

New York Power
Authority

WRITTEN COMMENTS OF

JAMES M. CUNNINGHAM

ON BEHALF OF THE

NEW YORK POWER AUTHORITY

AND THE LARGE PUBLIC POWER COUNCIL

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES,

AGRICULTURE RESEARCH AND ENVIRONMENT

COMMITTEE ON SCIENCE,

SPACE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

MARCH 12, 1991

Mr. Chairman and members of the subcommittee, my name is James Cunningham. I am the Senior Vice President of Public Affairs of the New York Power Authority (NYPA) and the Chairman of the Large Public Power Council's (LPPC) Task Force on electric and magnetic fields (EMF).

I am pleased to have this opportunity to present the comments of the New York Power Authority (NYPA) and the LPPC regarding the need for an electromagnetic field (EMF) national research program.

The LPPC consists of 18 of the nation's largest public power systems including the New York Power Authority. Member systems formed an Electric and Magnetic Fields Task Force (EMF) in recognition of the increasing importance of this issue to the electric utility industry and our entire society.

LPPC member systems are non-profit entities dedicated to economical and reliable service in the public interest. We serve about 35 percent of the customers in the United States who receive their electricity from public power systems. Our customers-- in cities, suburbs and rural areas from coast to coast and in Puerto Rico--are about 5 percent of all electricity customers in the nation.

LPPC systems are significant participants in the bulk power generation and transmission markets. We own and operate more than 40,000 megawatts (mw) of generating capacity and more than 25,000 circuit miles of high-voltage transmission lines.

We at the New York Power Authority have long been involved with the EMF issue through construction of major transmission lines, sponsorship of past research, and our role in a court case that attracted national attention.

In the 1970s, the Power Authority built a 765-kv transmission line from the Canadian border to central New York to carry electricity from Quebec. The first lengthy public hearing on EMF occurred during the licensing proceeding for that line. At our initiative, in 1980, an out-of-court settlement of litigation stemming from the line's licensing led to a $5 million research program on the biological effects of powerline fields. The study, known as the New York Power Lines Project was funded by NYPA and New York's investor-owned utilities. That project produced some of the most thorough research to date and gave rise to the current focus on magnetic fields.

The 1987 report by a nine-member Scientific Advisory Panel that supervised the program concluded that "most of the research studies reported no effects of concern." The report did however, cite several areas of "potential concern" that the panel believed required more study.

As you are no doubt aware, most of the interest that was generated by the report resulted from an epidemiological study conducted in the Denver area by Dr. David Savitz of the University of North Carolina. The Savitz Study found an association between EMF and childhood cancer.

The Stevens study, another study which was funded by the project, revealed no connection between EMF and adult leukemia in the Seattle area.

In a recently released study, Dr. John Peters of the University of Southern California, detailed the interim results of an EPRI-sponsored study on the possible influence of EMF on the development of childhood leukemia.

In his preliminary conclusions, Peters found that the highest level of measured magnetic field exposures was weakly associated with leukemia risk and that this risk was not statistically significant. In homes with intermidiate exposures, Peters found that the estimated risk was lower than in the homes with the lowest exposures.

In addition, Peters concluded that exposures to magnetic fields estimated by wire codes were associated with risk of leukemia, as previously found in two Denver studies. Further, based on the responses to the questionnaire, Peter's concluded that use of certain appliances was associated with increased risk of childhood leukemia.

During appearances last year before several Congressional subcommittees, I presented the LPPC's proposal for a national EMF research program to permit the broadest possible collection, analysis, and dissemination of data. Recognizing federal budget constraints and the urgent need for action, our proposal recommended that electric utilities and others help fund, but not manage, this research program.

The national study proposal is intended to capitalize on the best of what we now have, while responding to the concerns about credibility and coordination of research. Studies under the national study program would focus on areas of greatest scientific and public concern and would be closely coordinated with work by others to avoid duplication, except where justified on scientific grounds.

The structure of the research program which we propose would be similar to that of the New York Power Lines Project. We expect that the program would be conducted over a five year period. The program would be designed to assure that the quality of the science meets the high standards that this issue requires.

Under our proposal, the research program would be administered by an independent organization like the Health Effects Institute (HEI).

The administering organization, in consultation with an EMF Steering Committee, would suggest the names of scientists to serve as members of an EMF Research Committee and manage the program to ensure that the study's objectives are met.

The responsibilities of the Steering Committee would include selection of an organization to administer the EMF research program; identification of the national study's goals and objectives; involvement in the process for nomination of independent scientists to serve on the EMF Research Committee and EMF Research Review Panels; and the identification of an appropriate role if possible, in the national study for the National Academy of Sciences.

The Steering Committee also would be responsible for setting a conflict-of-interest policy, as well as a public communications policy.

We recommend that the Federal Government representatives on the Steering Committee be senior officials from agencies responsible for protecting the public health, such as the National Institute of Environmental Health Sciences; National Institute of Occupational Safety and Health; the office of the Surgeon General; and the Congressional Office of Technology Assessment. In addition, four to six senior state officials from health and/or environmental and utility regulatory disciplines would round out the Steering Committee. The Board of administering organization could select one additional independent public member.

The EMF Steering Committee would meet at least quarterly to provide advice to the Board of the administering organization and its staff on the EMF research program.

The EMF Research Committee would design and manage the research program. It would consist of eight to ten scientists from universities, agencies and/or medical organizations. Diverse scientific disciplines (e.g., epidemiology, biology, engineering) should be represented on this committee.

The Research Review Committee, which would have no role in the review of applications or in the selection of projects and investigations for funding, would be responsible for evaluating completed research projects. Members of the Research Review Committee should be expert scientists representing a broad range of basic environmental, and health sciences.

Our objective is to find answers to the scientific issues that have been raised and to respect the emerging public concerns on the EMF issue. Simply put, we must not let the emotions and the politics overwhelm the science on this issue. The public policy which is set and implemented must be based on scientific evidence--not on unsupported claims or fears.

Much attention has focused on electric transmission and distribution lines, but the issue is much broader than that. If we did not know it before, we are now all aware that magnetic fields are present whereever electricity flows.

If there is a problem, it involves all of the many uses of electricity in our society, from ordinary household appliances wiring to sophisticated computers of communications systems.

M. Granger Morgan and associates at Carnegie Mellon University concluded, in a background paper prepared in 1989 for the Congressional Office of Technology Assessment, that standard techniques for probabilistic risk assessment are not yet applicable to the EMF issue, due to the inability to define dose. The authors said that if electric and magnetic fields do produce health effects, "we do not yet know what attribute, or combination of attributes, of the field" produces them.

The EPA's draft report, which evaluates the research to date, reflects these uncertainties. As you know, that report concludes that at 60-hertz magnetic fields from power lines and perhaps other sources are a possible, but not a proven, cause of cancer.

The EPA is not the first to call for more research to resolve the uncertainties. But this recommendation is particularly meaningful when it comes from the nation's lead agency responsible for creating a healthier environment.

Reviews of the existing scientific literature have been prepared by numerous organizations, and those who support the national study concept believe that the EPA review of previous studies should be the last. There is almost universal agreement that more research is needed. Now is the time to move ahead to the next stage--additional research. We need answers, and we need them sooner rather than later.

Uncertainty about EMF breeds anxiety. Continued public anxiety will make it increasingly difficult to build needed new electric transmission lines that will benefit our society. Efforts to site and build new lines are likely to increase with the industry trend toward a greater role for independent power producers and with the recent passage of the Clean Air Act amendments. Mandated caps on emissions from existing fossil-fueled generating plants could shift reliance to facilities far from urban areas, placing greater demand on the transmission system and requiring new construction. In the current climate, it will be extremely difficult to win public acceptance for new construction proposals.

More than half of the EMF research in this country is sponsored by the Electric Power Research Institute (EPRI), a Palo Alto, California, research and development organization supported by the electric utility industry. EPRI spends about $6 million a year on EMF studies. The work is carried out by independent scientists at leading universities and laboratories, and is overseen by an independent advisory committee of scientists from outside the utility industry.

EPRI's research program is well respected by the scientific community, however, it sometimes has been difficult to eliminate the public's perception of bias because of utility funding of the research.

Some states, notably California and Florida, have funded their own independent research. Such fragmented efforts lack coordination. Limited research dollars should not be wasted on duplicative efforts or on studies that are not sufficiently well designed.

The best approach to establishing a sustained and adequately funded national research program on EMF is a partnership of federal and state governments, electric utilities, business, labor and other interested parties. The research must be focused, independent, and rigorous, and draw upon the expertise in our universities and research insitutions.

We are well on our way to developing a broad base of private sector support for the national study approach. The following organizations already have indicated their support for the concept: the Edison Electric Institute; National Electrical Manufacturers Association; Electric Power Research Institute; National Rural Electric Cooperatives Association; American Public Power Association; Empire State Electric Energy Research Corporation; International Brotherhood of Electrical Workers; and the Northeast Public Power Association.

We feel that the national study approach will assure high quality scientific research, maximize the efficient use of research dollars and produce results that will be accepted by the public.

The results--reliable, impartial, and credible--will help close the gap between science and public perceptions, and will provide a more solid basis for informed decision-making. We are confident that this effort will permit the development of a responsible public policy that recognizes and balances the benefits of electricity and the risks, if any to public health and safety.

SUBCOMMITTEE MARKUP OF THE ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1991

TUESDAY, APRIL 16, 1991

House of Representatives,
Committee on Science, Space, and Technology,
Subcommittee on Environment,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:39 a.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

[Immediately following consideration of H.R. 2011, the National Oceanic and Atmospheric Administration Authorization Act of 1991 and H.R. 2010, the National Oceanic and Atmospheric Administration Atmospheric Programs Authorization Act, the Subcommittee began its consideration of the Environmental Research, Development, and Demonstration Authorization Act of 1991.]

Mr. Scheuer. All right. Now we are on the Environment Subcommittee markup of the Environmental Research, Development, and Demonstration Authorization Act of 1991.

I ask unanimous consent that it be made in order for the subcommittee to consider a committee print to authorize appropriations for environmental research, development, and demonstration for fiscal years 1992, 1993, and 1994, and for other purposes.

[No response.]

Mr. Scheuer. Hearing no objections, so ordered.

The Clerk will read the committee print.

The Clerk. To authorize appropriations for environmental research, development, and demonstration for fiscal years 1992, 1993, and 1994.

Mr. Scheuer. I ask unanimous consent that the committee print be considered as read and open for amendment at any time.

[No response.]

Mr. Scheuer. There being no objection, so ordered.

The committee print now before us authorizes appropriations and gives direction to the research programs of the Environmental Protection Agency for fiscal years 1992, 1993, and 1994. The Administration requested $422 million for these programs in fiscal year 1992, an increase of $64 million, or 18 percent, above fiscal year 1991 levels. That's certainly a healthy and impressive increase.

The committee print authorizes the requested increase in funding, with some preprogramming of funds to increase spending in specific, identified programs. These include research efforts to investigate the effects of EMF, electro-magnetic fields, which have come only in recent months to be of such concern to us. They include additional spending for indoor air pollution, and augmentation of spending for source reduction research abatement, laboratory instrumentation and equipment, and extramural grants.

The reprogrammed funds include an additional $2.2 million for pollution source reduction research. Included in the fiscal year 1992 total of $13 million is an additional $7.2 million for indoor air pollution research, increasing the fiscal year 1992 total to $14 million. We have included an additional $1.1 million for electro-magnetic field research, EMF research, which nearly doubles this funding to $2 million for fiscal year 1992. The reprogrammed funds also include an additional $7.5 million for laboratory equipment for EPA's research laboratories, which increases the fiscal year 1992 total to $15 million, and it includes also $6.5 million to the Extramural Grant Program, which increases the fiscal year 1992 allotment to $30 million.

These increases were made within the President's budget request, I repeat. By decreasing overall funding in each research area by 7.8 percent across the board, we are living within the President's budget recommendation.

For fiscal year 1993, the committee print recommends funding at $491 million, a $69 million—or a 16.4 percent— increase for fiscal year 1993. The fiscal year 1994 recommended funding level is $572 million, up $81 million, or a 16.4 percent increase over the fiscal year 1993 levels. If enacted, the bill would increase EPA's research budget $150 million over three years at an annual rate of increase averaging 16.4 percent increase, a healthy and respectable rate of increase.

Compared with the past several years, these funding levels represent significant increases for environmental research. While this increase is still a far cry from the level which would be needed to increase the budget to $750 million by 1993, which is a strong recommendation of EPA's Independent Science Advisory Board, it provides for healthy levels of growth over the next three years.

The subcommittee remains concerned, however, that the Administration's budget proposals are not keeping pace with the escalating demand for increasingly technical and innovative solutions to environmental problems. While this bill will not solve this problem, it should send a strong bipartisan signal to the White House that Congress wants a robust and healthy environmental research program at EPA.

To enhance research we will not only continue to identify and assess new environmental problems, but will also be better armed to prevent environmental problems through wise management. And in the same bipartisan spirit, I would like to commend the ranking Republican member, Mr. Don Ritter of Pennsylvania, for his support and cooperation, as well as other members of the subcommittee on both sides of the aisle.

At this point would you like to be recognized, Mr. Ritter?

Mr. **Ritter**. Thank you, Mr. Chairman, and thank you for the kind remarks. And, I also thank you for your leadership in this most important area to our country.

The EPA bill authorizes fiscal year 1992 funding for programs at the level called for in the President's budget. That's good, and yet, important things are going to be done and some important new ventures will be made.

I will be offering two amendments to the EPA bill. The first, which I will be offering with our new colleague, Congressman Dick Zimmer of New Jersey—who was, I might add, very active in the New Jersey Senate in the area of environment—and that amendment would establish a pilot program at the EPA's Office of Research and Development in risk-based budgeting.

The EPA's independent Science Advisory Board, the SAB, has called upon the EPA to establish some kind of risk reduction strategy, a targeting of EPA's limited resources, to try to address the worst problems first. Doing this gives America a cleaner environment, and it also makes better and more efficient use of limited taxpayers' dollars.

The amendment is also consistent with Administrator Bill Reilly's recent calls for "effective risk reduction."

Mr. Chairman, in the interest of time, I will reserve further comment on the amendment until the bill is brought before us for amendment.

The second amendment would direct the Agency to establish a separate research program in the evaluation of health and ecological risks. This amendment is also consistent with actions which the Agency is presently undertaking and would fill in critical data gaps in our understanding of risks to the environment.

Mr. Chairman, America's environmental policy should not be driven solely by the "Carcinogen-of-the-Month Club."

I thank you, Mr. Chairman, for your consideration of these amendments, and I look forward to helping you shepherd these bills through the legislative process.

Mr. **Scheuer**. I thank the gentleman for his commitment and for his cooperation and leadership.

Do any other members of the subcommittee wish to be recognized for a statement or to request any further explanation of the committee print?

[No response.]

Mr. **Scheuer**. All right.

Mr. **Wolpe**. If I may, just very briefly, I just wanted to take a second to express my appreciation to you and to Mr. Ritter and your staffs for your efforts in developing this legislation.

I am particularly pleased with the increased focus and resources that are being provided in the areas of source reduction research and in the area of electro-magnetic fields. As you know, our staffs have been working together on the EMF issue, and I am pleased to see that we found the additional resources for a $1.1 million increase in research that will help us more quickly address many unanswered questions. I know this is a matter of great concern back in my own State of Michigan at this point, as it is to many of my colleagues throughout the country.

So again, I just wanted to say how much I appreciate your willingness to give this additional emphasis to this all-critical area of research.

Mr. **Scheuer**. All right. Does anybody have any objection if we consider these amendments en bloc?

[No response.]

Mr. **Scheuer**. All right. In that case—Mrs. Morella, do you have an amendment that you want us to consider this morning?

Mrs. **Morella**. Yes, I do indeed, sir. I think it's Amendment No. 3, here, and it really kind of says it all, in terms of responding to EPA's Science Advisory Board's "Future Risk Research Strategies for the 1990s: Reducing Risk and Setting Priorities for Environmental Protection." And, what those articles do in depth is urge EPA to conduct research that is useful to various segments of society. It deals with technology transfer and would inspire EPA to carry on further in that particular regard.

I hope the Subcommittee will accept it.

[The amendment offered by Mrs. Morella follows:]

MORELL003

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MRS. MORELLA

Page 14, after line 2, insert the following new section:

SEC. 12. TECHNOLOGY TRANSFER AND INFORMATION EXCHANGE.

The Administrator shall carry out a program of environmental technology transfer and exchange of scientific and technical information designed to make full and effective use of the Agency's research, development, and demonstration efforts. The Administrator may establish and maintain resources necessary to advance such technology transfer and information exchange program.

Mr. SCHEUER. All right. Do any of the—Mr. Wolpe, do you want to briefly explain your amendment?

Mr. WOLPE. Yes, Mr. Chairman, thank you.

As you know, I was joined by many members of this subcommittee in drafting a comprehensive pollution prevention research bill, the Pollution Prevention Advancement Act, which will again be reintroduced later this spring. But as for today, advancing the three-year EPA authorization bill, I have been working with the subcommittee in drafting an amendment which provides greater resources and direction to EPA's multimedia research in the area of waste reduction. Specifically, my amendment would authorize $4 million for fiscal year 1992; $15 million for fiscal year 1993; and $30 million for fiscal year 1994 for research development and demonstration projects of various technologies. Priority is given to hazardous waste research which will identify and promote the use of nontoxic substitutes and solid waste research to identify new processes to reduce the volume of toxicity and address the pollution impacts of various products.

For both hazardous and solid waste, research priorities would focus on ways to identify and mitigate socioeconomic and institutional barriers to source reduction. Additionally, our amendment requires EPA, when submitting its budget to Congress, to distinguish source reduction activities and to estimate the environmental benefits and cost savings derived from such projects.

I might take a moment also just to express my thanks to Mr. Ritter for incorporating into the amendment that he is about to describe separate recognition of the need to continue source reduction efforts at the same time that we begin to prioritize existing environmental risks. Clearly, preventing pollution in the first place is the ultimate risk reducer. And while we continue to best manage our current environmental hazards, we cannot cease to look ahead to ways to prevent waste in the first instance, and that has been the thrust of the efforts of both my amendment and of that additional language that he has added to his own.

Thank you, Mr. Chairman.

[The amendment offered by Mr. Wolpe follows:]

WOLPE010

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. WOLPE

Page 14, after line 2, insert the following new section:

SEC. 12. SOURCE REDUCTION RESEARCH AND DEVELOPMENT.

(a) REQUEST FOR APPROPRIATIONS.--The annual request for appropriations for the Environmental Protection Agency shall distinguish funding requested for source reduction research and development and demonstration activities. Such request for appropriations shall be accompanied by a list of all source reduction research and development and demonstration projects funded for the previous fiscal year, and an estimate of the environmental benefits and cost savings derived from such projects.

(b) AUTHORITIES.--The Administrator may plan and undertake multimedia source reduction research and development and demonstration projects. Such research shall include the following:

(1) Source reduction (as defined in section 6603(5) of the Pollution Prevention Act of 1990) of hazardous substances, pollutants, or contaminants released to land, air, and water. In conducting research, the Administrator shall give priority to identifying and promoting the use

of nontoxic substitutes and to identifying and mitigating socioeconomic and institutional barriers to source reduction efforts.

(2) Source reduction of nonhazardous wastes, including wastes generated by households, commercial establishments, institutions, industries, agricultural operations, energy exploration, and construction and demolition activities. Such research shall address pollution impacts of products, socioeconomic and institutional barriers to source reduction, and new practices and processes to reduce the volume and toxicity of wastes.

(c) AUTHORIZATION OF APPROPRIATIONS.--Of the amounts authorized under section 2(a)(7), there are authorized to be appropriated for carrying out this section $4,000,000 for fiscal year 1992, $15,000,000 for fiscal year 1993, and $30,000,000 for fiscal year 1994.

Mr. **Scheuer**. Mr. Ritter.

Mr. **Ritter**. Thanks, Mr. Chairman.

I want to commend the gentleman from Michigan, Mr. Wolpe, for his insight into this important issue.

Let me just say, on behalf of the Ritter-Zimmer amendment, much of the work that the EPA's researchers do now is mandated by statute, but there is considerable discretion for the Agency to move toward committing its resources to addressing the worst problems first. This amendment directs the Agency to start a budgetary process based on risk concerns. It would direct the Office of Research and Development to identify and rank 10 or more of the most pressing environmental hazards; set research and funding priorities; and report back to the Congress on how the analysis was integrated into the budgetary process.

If this pilot effort catches on, we may remember today as an historic day, a milestone in the drive toward more effective risk reduction as the cornerstone of environmental protection, more science-based risk reduction, more science-based addressing of the Nation's pollution and environmental priorities. We can't, as a Nation, be driven by Hollywood stars descending upon Washington, D.C., armed with great media prowess, and ending up driving the budgets and the actual efforts of a whole Federal agency toward risk reduction that may not be that important.

So, I thank you, Mr. Chairman, for your consideration of this amendment and your cooperation, and I yield back the balance of my time.

The gentleman from New Jersey may wish to make a few remarks on this amendment.

[The amendment offered by Mr. Ritter and the amendment offered by Messrs. Ritter and Zimmer follow:]

RITTER008

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. RITTER

Page 14, after line 2, insert the following new section:

SEC. 12. RESEARCH TO SUPPORT THE EVALUATION OF HEALTH AND ECOLOGICAL RISK.

(a) ESTABLISHMENT.--The Administrator shall establish a separately identified research program designed to improve the capability of the Environmental Protection Agency to identify, assess, and compare risks to public health and natural ecosystems resulting from contamination of the environment.

(b) OBJECTIVES.--Under the program authorized by subsection (a), the Administrator may conduct research to--

(1) develop and improve methodologies for the comparison of risks to public health and natural ecosystems, including risks resulting from contamination of different environmental media;

(2) facilitate the monitoring of pollutants and contaminants discharged to the environment;

(3) develop effective strategies for reducing risks to natural ecosystems;

(4) develop and improve methodologies for the assessment of noncancer risks to public health and the

integrated assessment of cancer and noncancer health risks;

(5) support any other activities of the Environmental Protection Agency relating to the identification, assessment, or comparison of risks to public health and natural ecosystems resulting from contamination of the environment; and

(6) develop improved methodologies for evaluating the benefits, both quantitatively and qualitatively, of ecological protection activities, including improved methods to value natural resources and to account for long-term environmental effects in the Agency's economic analysis.

RITTER196

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. RITTER AND MR. ZIMMER

Page 14, after line 2, insert the following new section:

SEC. 12. RISK-BASED BUDGETING.

(a) IDENTIFICATION OF PRIORITY ISSUES.--The Administrator of the Environmental Protection Agency (hereinafter in this section referred to as the ``Administrator'') shall identify at least 10 research issues, correlating to environmental hazards in the category of highest risk to human health and the environment.

(b) SOURCE REDUCTION.--The Administrator shall outline research priorities on efforts aimed at eliminating or minimizing the generation of wastes or pollutants, as an issue to be considered in parallel with the issues identified under subsection (a).

(c) STRATEGIC PLANNING.--The Administrator shall address each of the issues identified under subsection (a) or described in subsection (b) as part of an overall strategic planning process. Such process shall include--

(1) an assessment of research that has been or is being conducted with respect to each such issue;

(2) an identification of additional research which needs to be conducted with respect to each such issue;

(3) a definition of research objectives on such issues;

(4) the establishment of priorities for research in and among such issues;

(5) coordination of research priorities with the budget planning process; and

(6) provision for the continuation and improvement of risk-based budgeting on research issues.

(d) REPORT TO CONGRESS.--The Administrator shall submit to Congress, along with the budget request for fiscal year 1993, a report--

(1) describing the identification and planning activities undertaken pursuant to this section;

(2) describing the manner in which such activities are reflected in such budget request;

(3) stating confidence levels and identifying data necessary to improve confidence associated with each issue identified under subsection (a) or described in subsection (b); and

(4) identifying and describing technological barriers, and opportunities for reducing or eliminating such barriers, associated with mitigating the hazards addressed in connection with each issue identified under subsection (a) or described in subsection (b).

Mr. Zimmer. I would, Mr. Chairman.

Thank you, Mr. Chairman. It is a great honor to be a cosponsor of this amendment with my colleague from across the Delaware River.

I have been concerned, as a member of our State Legislature, with the same problem that has attacked the environmental policymaking process at the Federal level: that politics rather than science is driving our priorities. I think that this may well be an historic initiative, and I hope that, with the success of the approach that we would apply to the Office of Research and Development of the Environmental Protection Agency, that this approach would be expanded to apply to the other programs of the EPA, as well as, perhaps, programs of other Federal agencies, such as the Food and Drug Administration.

I would also hope that, with the success and the common sense of this approach becoming manifest over the next months and years, that we would help to educate our colleagues in the Congress of the benefits of having a risk-based policy rather than one driven by politics.

So, it is with great pleasure that I add my name to this amendment. I certainly hope it would be adopted.

Mr. Ritter. If the gentleman would just yield for a moment?

Mr. Zimmer. Certainly.

Mr. Ritter. I thank the gentleman for yielding.

Just briefly, I want to thank him for his cooperation and his insights. As I mentioned, for many years in the New Jersey State Senate, Dick Zimmer was a leader on environmental issues, and I think we are very fortunate to have him on this Subcommittee and on this Committee.

He mentioned the words, "common sense." I think that's what it's all about, and that's really what we are trying to bring here. The bottom line is, is this good for a cleaner environment? This gives you a cleaner environment, because it approaches the most pressing environmental concerns first and is good for taxpayers, because their money doesn't go down some endless black hole, endlessly chasing very, very small amounts of molecules that may not really have impact on the environment or on human health.

So with that, Mr. Chairman, I yield back to the gentleman from New Jersey.

Mr. Zimmer. I yield back my time.

Mr. Scheuer. I thank the gentleman from New Jersey, and I welcome his initiative. He is already, at a very junior point in his career, playing a remarkably significant role on this subcommittee.

We welcome you to it and we know that you are going to continue to add luster and accomplishment to the work of our subcommittee, and I express my appreciation.

Now, there is one last amendment that hasn't been discussed that I will touch on very briefly, and that is my amendment on lead exposure monitoring detection and abatement.

Recent studies in children on the neurotoxicity of lead have discovered adverse effects of lead on children, on the attention span and on problem-solving capability, at much lower blood concentrations than previously had been considered safe. This is an alarming development.

The time has come, I am convinced, to address the problem of lead contamination head-on, as we did in banning leaded gasoline in the Clean Air Act. Although the blood levels of lead in children have been reduced as a result in the decrease in usage of leaded gasoline, the job is far from finished. Now that scientific studies are uncovering negative impacts on the brain at lower and lower levels of lead concentration in the blood stream, we must proceed with a national strategy to reduce lead contamination.

The amendment that I am introducing today provides critical steps in the right direction by setting standards for the measurement, exposure, and abatement of lead contamination, and I believe the minority—all members are familiar with that.

[The amendment offered by Mr. Scheuer follows:]

SCHEUE056

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. SCHEUER

Page 14, after line 2, insert the following new section:

SEC. 12. LEAD EXPOSURE MONITORING, DETECTION, AND ABATEMENT.

(a) DETECTION TECHNOLOGIES.--

(1) EMERGING TECHNOLOGIES RESEARCH.--The Administrator of the Environmental Protection Agency, in consultation with the Secretary of Housing and Urban Development and utilizing the services of the National Institute of Standards and Technology, shall conduct research on methods for evaluating emerging products and techniques for detecting lead in paint films and dust, including x-ray fluorescence devices, on-site chemical spot testers, and laboratory methods. The Administrator shall submit a report on the results of such research to Congress within 18 months after the date of enactment of this Act and biennially thereafter.

(2) STANDARDIZATION.--The National Institute of Standards and Technology shall, within 2 years after the date of enactment of this Act, establish protocols, criteria, and minimum performance standards to be used in the evaluation required by paragraph (1) and to ensure reliable, accurate, and effective lead detection

technologies.

(b) RESEARCH ON ABATEMENT AND IN-PLACE MANAGEMENT TECHNIQUES.--The Administrator of the Environmental Protection Agency, in cooperation with the Secretary of Housing and Urban Development and the Secretary of Defense, shall conduct research on the short-term and long-term efficacy of lead abatement and in-place management techniques for housing based on subsequent levels of lead in dust and in occupants' blood. Such research shall also address the cost effectiveness and reasonableness of State standards for post-abatement lead dust clearance levels. The Administrator shall submit a report on the results of such research to Congress within 18 months after the date of enactment of this Act and biennially thereafter.

(c) ABATEMENT PRODUCTS.--

(1) RESEARCH.--The Administrator of the Environmental Protection Agency, in consultation with the Secretary of Housing and Urban Development and the Secretary of Defense, and utilizing the services of the National Institute of Standards and Technology, shall conduct research on the safety, efficacy, durability, and other relevant performance properties of products for encapsulating or stripping lead-based paint. The Administrator shall submit a report on the results of such research to Congress within 2 years after the date

of enactment of this Act and biennially thereafter.

(2) STANDARDIZATION.--The National Institute of Standards and Technology shall--

(A) establish performance criteria and standards for encapsulants within 2 years after the date of enactment of this Act; and

(B) establish performance criteria and standards for strippers within 2 years after the date of enactment of this Act.

(d) LEAD EXPOSURE IN CHILDREN.--The Administrator of the Environmental Protection Agency shall conduct a long-term research study to establish the sources of lead exposure for children with blood lead levels greater than 10 micrograms per deciliter. Such research shall seek to establish the relative contributions to lead body burden of such children from drinking water, food, lead-based paint and dust from lead-based paint, and air and soil. The Administrator shall submit an interim report on the results of such research to Congress within 18 months after the date of enactment of this Act, and shall submit a final report within 3 years after such date of enactment.

(e) PUBLIC EDUCATION.--The Administrator of the Environmental Protection Agency, in cooperation with other appropriate Federal agencies, shall sponsor public education and outreach efforts to increase awareness of the scope and severity of lead poisoning from household sources, as evidenced by research conducted under this section and otherwise, and the need for careful, quality abatement and management actions. The Administrator shall focus efforts under this section on critical target groups as well as the general public.

(f) AUTHORIZATION OF APPROPRIATIONS.--Of the amounts authorized under section 2(a)(7), there are authorized to be appropriated to the Administrator of the Environmental Protection Agency for activities of such Agency and the National Institute of Standards and Technology under this section--

(1) $2,400,000 for fiscal year 1992, of which $1,200,000 shall be for the activities of the National Institute of Standards and Technology;

(2) $8,000,000 for fiscal year 1993, of which $2,500,000 shall be for the activities of the National Institute of Standards and Technology; and

(3) $8,000,000 for fiscal year 1994, of which $1,000,000 shall be for the activities of the National Institute of Standards and Technology.

(g) LABORATORY ANALYSIS STANDARDIZATION.--The Administrator of the Environmental Protection Agency shall provide funds required for establishing a voluntary accreditation program to the National Institute of Standards and Technology. The National Institute of Standards and Technology shall, within 18 months after the date of enactment of this Act, establish protocols, criteria, and performance standards, and implement a voluntary accreditation program with respect to laboratory analysis of lead in paint films, soil, and dust. Funds received through fees and other charges for accreditation services under such program may be used by the National Institute of Standards and Technology for operating costs of the program.

Mr. SCHEUER. Now, is any amendment today in controversy?

[No response.]

Mr. SCHEUER. If none of them are in controversy, then I think we can complete the work of the subcommittee this morning by one vote, in which we would approve them en bloc. I would only do that if there are no special points at issue which individual members would like to raise.

Are there any points on any of these amendments that members would like to bring to the attention of the subcommittee?

[No response.]

Mr. SCHEUER. Then if that's not true, I move that we approve all of these amendments by one vote, en bloc.

Mr. RITTER. Mr. Chairman, you have the cooperation of the minority on this.

Mr. SCHEUER. I thank you very much and I am grateful for that.

So all of those who would approve all of these amendments as offered, en bloc, approve them with one vote, en bloc, please say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. There being no opposition, all of these amendments are approved en bloc as they have been presented this morning.

Does anybody have any report language that they wish to include in the committee print on any of these amendments that we have approved en bloc?

[No response.]

Mr. SCHEUER. If you do, speak to me or have your staff speak to Dr. Eileen Lee, our Staff Director, and we will be happy to cooperate with you on report language.

I would now ask my colleague, the ranking member of this subcommittee, Congressman Ritter of Pennsylvania, to move the usual.

Mr. RITTER. Mr. Chairman, at this time I move that the subcommittee report the bill as amended. Furthermore, I move to instruct the staff to prepare the Subcommittee report, to make technical and conforming amendments, and move that the Chairman take all necessary steps to bring the bill before the full Committee for consideration. Furthermore, I move that a clean bill be prepared by the Chairman for introduction in the House and further consideration by the Committee.

Mr. SCHEUER. Okay. All those in favor, please say aye.

[Chorus of ayes.]

Mr. SCHEUER. All those opposed, say nay.

[No response.]

Mr. SCHEUER. There being no opposition, the ayes have it. The ayes have it and the bill and all of the amendments are passed.

The markup this morning is completed. I thank my colleagues for their fine cooperation, and the committee is adjourned.

[Whereupon, at 11:10 a.m., the Subcommittee adjourned, to reconvene at the call of the Chair.]

FULL COMMITTEE MARKUP OF H.R. 2404, ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION AUTHORIZATION ACT OF 1991

WEDNESDAY, MAY 22, 1991

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, DC.

The committee met, pursuant to notice, at 10:27 a.m., in room 2318, Rayburn House Office Building, Hon. George E. Brown, Jr. (chairman of the committee) presiding.

[Immediately following consideration of H.R. 2282, the National Science Foundation Authorization Act Amendments of 1991 and H.R. 2399, the Energy Technology Research and Development Authorization Act of 1991, the Committee began its consideration of H.R. 2404, the Environmental Research, Development, and Demonstration Authorization Act of 1991.]

The CHAIRMAN. The committee will now consider a bill reported by the Subcommittee on Environment authorizing funding for the Environmental Protection Agency's Office of Research and Development. The Subcommittee on the Environment has worked very diligently and responsibly to develop funding recommendations for this very important program, and I would like to commend the chairman of the subcommittee, Mr. Scheuer, and the ranking minority member, Mr. Ritter, for their work on this bill.

The President's fiscal year 1992 budget request of $491 million for R&D is 13.6 percent higher than the current fiscal year 1991 level. In real dollars, however, it is still 3 percent lower than the EPA R&D investment of a decade ago, and it is less than one-half of 1 percent of the amount the country spends to handle the billions of tons of waste generated by this Nation each year.

The bill reported by the subcommittee authorizes a total funding level that is equivalent to the President's request; however, the subcommittee adjusted the various program elements to better reflect pressing research needs.

Without objection, I will ask that the remainder of my statement be included in the record at this point, and the Chair will recognize the gentleman from New York, Mr. Scheuer.

[The prepared opening statement of Mr. Brown follows:]

OPENING STATEMENT

THE HONORABLE GEORGE E. BROWN, JR.
CHAIRMAN
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

MAY 22, 1991

The Committee will now consider a bill, reported by the Subcommittee on Environment, authorizing funding for the Environmental Protection Agency's Office of Research and Development.

The Subcommittee on the Environment has worked diligently and responsibly to develop funding recommendations for this most important program. I would like to commend the Chairman of the Subcommittee, Mr. Scheuer, and the Ranking Minority Member, Mr. Ritter, for their work on this bill.

The President's Fiscal Year 1992 budget request of $491 million ($422 excluding Superfund and L.U.S.T.) for environmental R&D:

- Is 13.6 percent higher than the current, Fiscal Year 1991 level of $432.6 million.
- In real dollars, is three percent lower than the EPA R&D investment a decade ago.
- Is less than one half of one percent of the amount the country spends to handle the billions of tons of waste generated by this nation each year.

The bill reported by the Subcommittee on Environment authorizes a total funding level for the Office of Research and Development that is equivalent to the President's request.

However, the Subcommittee adjusted the funding levels of the various program elements within ORD to better reflect pressing research needs.

For example:

- Additional funding was provided for research on indoor air quality, pollution prevention, and electromagnetic fields; and
- Additional funding was provided for extramural grants and for laboratory instrumentation and equipment.

These programmatic increases total $24.5 million. In order to accommodate these increases, the Subcommittee on Environment reduced all research programs by 7.8% across the board.

Although research has been used cynically in the past as an excuse for inaction, it is indeed the basis for intelligent action. The Environmental Protection Agency, under pressure to set standards and enforce regulations, has often been forced to forego research that would improve our understanding of the causes and effects of pollutants on human health and complex ecosystems.

The emphasis on regulation is also reflected in EPA's overall R&D budget, which has been steadily shrinking in proportion to total EPA budget.

Since basic research takes time to bear fruit, we must invest in environmental research today if we are to generate tomorrows answers.

Large gaps in our knowledge base regarding such critical factors as actual human exposure to hazards, methods to evaluate ecological damage from pollutants, and ways to evaluate the comparative success of various pollutant control strategies hinder our ability to respond effectively to environmental hazards.

I plan to offer an amendment which would restore the $24.5 million across the board cut to the Office of Research and development budget. This will allow EPA to carry out the research planned in the President's budget as well as additional work in areas that the Committee believes warrant greater attention.

Mr. SCHEUER. Thank you, Mr. Chairman.

Mr. Chairman, on April 16, 1991, the Subcommittee on Environment unanimously passed and ordered reported to the full committee the authorization for EPA's Environmental Research Programs for the fiscal years 1992, 1993, and 1994. The bill which is before the committee now is H.R. 2404.

Mr. Chairman, this bill authorizes the Administration's request for funding, with some reprogramming of funds to reflect increased spending in specific programs. These include research efforts to investigate the effects of EMF—electromagnetic fields—and indoor air pollution, and these initiatives increased the President's funding request for source reduction research, pollution abatement, laboratory instrumentation and equipment, and extramural grants.

The reprogrammed funds include an additional $2.2 million for pollution source reduction research, increasing the fiscal year 1992 total to $13 million; an additional $7.2 million for indoor pollution research, increasing the fiscal year 1992 total to $14 million; $1.1 million for EMF research, which nearly doubles this funding to $2 million for fiscal year 1992; $7.5 million for laboratory equipment for EPA's research laboratories, which increases the fiscal year 1992 total to $15 million; and $6.5 million to the Intramural Grant Program, which increases the fiscal year 1992 total to $30 million.

Mr. Chairman, these increases were made within the President's request by decreasing overall funding in each research area by 7.8 percent across the board. For fiscal year 1993, the bill recommends funding at $491 million, a $69 million or 16.4 percent increase. For fiscal year 1994, recommended funding is at the $572 million level, which is an $81 million or 16.4 percent increase over fiscal year 1993 levels.

The CHAIRMAN. The Chair thanks the gentleman for his statement and recognizes the gentleman from Pennsylvania, Mr. Ritter.

Mr. RITTER. Thanks, Mr. Chairman.

I want to commend you and Mr. Walker and the Environment Subcommittee chairman, Mr. Scheuer, for all your leadership efforts in bringing this bill before us today.

The Environmental Research, Development, and Demonstration Act of 1991 is a sound bill authorizing funding for important environmental research at the Environmental Protection Agency. EPA's research, conducted by the Office of Research and Development (ORD) supports the Agency's regulatory activities under the major environmental statutes, including the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act (RCRA) and CERCLA and other statutes. The Office of Research and Development has another important mission: to carry out research to reduce uncertainties in the regulatory process.

Mr. Chairman, last fall, the EPA's independent Science Advisory Board issued a report entitled "Reducing Risk: Setting Priorities and Strategies for Environmental Protection." A key recommendation of that report was that EPA should set priorities, based on the scientific results originating from ORD, to address the worst environmental risks first. An article last week in Fortune magazine found that public and private spending to clean up the environment will total $150 billion in the year 2000, nearly 3 percent of our national GNP. The research done by the EPA can help ensure that these funds are spent in the most cost-effective and environmentally beneficial manner.

So, I support the efforts of the EPA, under the leadership of the able Administrator William Reilly, to move in the direction of "worst first" regulation, and I'm pleased to have co-authored, with my Subcommittee colleague, Mr. Zimmer of New Jersey, Section 15 of the bill, which directs the agency to use risk-based concerns in its budgetary process. The bill before us funds ORD's activities at a total level of $422 million in fiscal year 1992, with increased funding in the out years. There's funding directed to priority areas, such as research on indoor air quality, source reduction and electromagnetic fields.

The proposed funding levels reflect a healthy increase in R&D funding, given overall fiscal pressures. The Science Advisory Board has recommended that the EPA budget double in five years, and the bill before us is a commendable step toward moving in that direction.

I strongly support this bill, Mr. Chairman, and I urge my colleagues to do the same, I yield back the balance of my time.

[The prepared opening statement of Mr. Ritter follows:]

OPENING STATEMENT
HON. DON RITTER (R-PA)
EPA RD&D AUTHORIZATION ACT
MAY 22, 1991

THANK YOU, MR. CHAIRMAN. I COMMEND YOU, MR. WALKER, AND THE ENVIRONMENT SUBCOMMITTEE CHAIRMAN, MR. SCHEUER, FOR YOUR EFFORTS IN BRINGING THIS BILL BEFORE US TODAY.

THE ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT OF 1991 IS A SOUND BILL AUTHORIZING FUNDING FOR IMPORTANT ENVIRONMENTAL RESEARCH AT THE ENVIRONMENTAL PROTECTION AGENCY. EPA'S RESEARCH, CONDUCTED BY THE OFFICE OF RESEARCH AND DEVELOPMENT, SUPPORTS THE AGENCY'S REGULATORY ACTIVITIES UNDER THE MAJOR ENVIRONMENTAL STATUTES, INCLUDING THE CLEAN AIR ACT, CLEAN WATER ACT, RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), AND OTHER STATUTES.

THE OFFICE OF RESEARCH AND DEVELOPMENT HAS ANOTHER IMPORTANT MISSION: TO CARRY OUT RESEARCH TO REDUCE UNCERTAINTIES IN THE REGULATORY PROCESS. LAST FALL, THE EPA'S INDEPENDENT SCIENCE ADVISORY BOARD ISSUED A REPORT ENTITLED "REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION." A KEY RECOMMENDATION OF THAT REPORT WAS THAT EPA SHOULD SET PRIORITIES, BASED ON THE SCIENTIFIC RESULTS ORIGINATING FROM ORD, TO ADDRESS THE WORST ENVIRONMENTAL RISKS FIRST.

AN ARTICLE LAST WEEK IN FORTUNE MAGAZINE FOUND THAT PUBLIC AND PRIVATE SPENDING TO CLEAN UP THE ENVIRONMENT WILL TOTAL $150 BILLION IN THE YEAR 2000, NEARLY 3% OF OUR NATIONAL GNP. THE RESEARCH DONE BY THE EPA CAN HELP ENSURE THAT THESE FUNDS ARE SPENT IN THE MOST COST-EFFECTIVE, AND ENVIRONMENTALLY BENEFICIAL MANNER.

I SUPPORT THE EFFORTS OF THE AGENCY, UNDER THE LEADERSHIP OF THE ABLE ADMINISTRATOR, WILLIAM REILLY, TO MOVE IN THIS DIRECTION OF "WORST FIRST," AND I AM PLEASED TO HAVE CO-AUTHORED, WITH MY SUBCOMMITTEE COLLEAGUE MR. ZIMMER OF NEW JERSEY, SECTION 15 OF THE BILL, WHICH DIRECTS THE AGENCY TO USE RISK-BASED CONCERNS IN ITS BUDGETARY PROCESS.

THE BILL BEFORE US FUNDS ORD'S ACTIVITIES AT A TOTAL LEVEL OF $422 MILLION IN FY 92, WITH INCREASED FUNDING IN THE OUT YEARS. THERE IS FUNDING DIRECTED TO PRIORITY AREAS SUCH AS RESEARCH IN INDOOR AIR QUALITY, SOURCE REDUCTION, AND ELECTROMAGNETIC FIELDS.

THE PROPOSED FUNDING LEVELS REFLECT A HEALTHY INCREASE IN R&D FUNDING, GIVEN OVERALL FISCAL PRESSURES. THE SCIENCE ADVISORY BOARD HAS RECOMMENDED THAT THE EPA R&D BUDGET DOUBLE IN FIVE YEARS, AND THE BILL BEFORE US IS A

COMMENDABLE STEP TOWARD MOVING IN THAT DIRECTION. I STRONGLY SUPPORT THIS BILL, AND I URGE MY COLLEAGUES TO DO THE SAME.

The **Chairman**. Does any other member have any comments with regard to the——

Mr. **Wolpe**. Mr. Chairman.

The **Chairman**. The Chair will recognize Mr. Wolpe first.

Mr. **Wolpe**. Thank you very much, Mr. Chairman. Just a very brief statement.

I am pleased to support the authorization bill that is before us. I had intended to offer an amendment to increase the EPA budget by 10 percent over the President's request in order to secure much-needed additional resources for high-priority research areas, including indoor air pollution, pollution prevention, and electromagnetic fields, and also in order to establish an appropriate policy direction for this committee.

In the past few weeks, we've worked with other members on this committee to try to achieve some of these goals and to provide the resources for other important programs in other areas, and the outcome of these discussions is the legislation before us, which would provide a 5.8 percent increase for EPA, about $24.5 million above the President's request. These additional resources will, in fact, allow us to fund all the research programs at the President's level, while providing some minimal increases for highest science priorities, and I think that represents a very important first step in beginning to adequately fund and to shift EPA's research focus. So I'm pleased to support this legislation.

The **Chairman**. If the gentleman will allow me, I think the gentleman is referring to an amendment which I propose to offer which will provide the increases that the gentleman referred to, although not the same degree to which he would have preferred that they be increased.

Mr. **Wolpe**. That is correct, Mr. Chairman.

The **Chairman**. Mr. Walker.

Mr. **Walker**. Thank you, Mr. Chairman.

Mr. Chairman, with the markup of this EPA authorization bill, of which I'm pleased to be a cosponsor, the Science Committee will complete the markup phase of all agency authorization bills under its jurisdiction for fiscal year 1992.

First of all, I want to say to you, Mr. Chairman, that's quite an accomplishment. That means that we have done all of this before the 1st of June, and I think that that speaks well to the work of the Subcommittees involved, each of the Subcommittee Chairmen, and the Ranking Republicans on those Subcommittees, as well as the effort that you have shown in driving us toward getting this work done on an expeditious basis.

Mr. **Scheuer**. Will my colleague yield?

Mr. **Walker**. Sure, I'd be glad to yield to the gentleman from New York.

Mr. **Scheuer**. I also want to pay credit and congratulate the ranking minority member of the subcommittee who serves ex officio on this subcommittee and the ranking minority member of the full committee for his outstanding efforts, his deep interest and concern and the full cooperation and openhandedness with which he has involved himself deeply in our activities. Where we have had agreement, it's been open, above-board, on the table, and we've negotiated those agreements out in what, from my point of view, is a very satisfactory way.

I also wish to congratulate the ranking minority member of the subcommittee, the gentleman from Pennsylvania, Mr. Ritter, for his equally cooperative and helpful attitude. I feel fortunate—I feel that the full committee and the subcommittee are fortunate to have had ranking minority members of such quality and dedication to the general goals and the general mission of this committee.

Mr. WALKER. I thank the gentleman, and I'll get a copy of this transcript and send it to my mother. [Laughter.]

No, I do appreciate it. Thank you.

Even more important, I think, that the fact that we have done it on a timely basis, Mr. Chairman, I think it's important to recognize also that with this final action, the total amount authorized by the Committee for all of its bills will be within the President's budget request. Especially compared with some previous years, this is quite an accomplishment, and I would like to congratulate the Chairman for his leadership in making that happen as well.

Mr. Chairman, as a co-sponsor, I support the Committee reporting H.R. 2404, with certain amendments, as recommended by the Subcommittee for this bill. Mr. Scheuer, the Subcommittee Chairman, and Mr. Ritter, the Ranking Republican Member, are to be commended for producing an excellent bill.

I have some additional remarks, Mr. Chairman, and I ask unanimous consent that they be placed in the record.

The CHAIRMAN. Without objection, that will be the order.

[The prepared opening statement of Mr. Walker follows:]

HON. ROBERT S. WALKER (R-PA)

OPENING STATEMENT

H.R. 2404, EPA BILL

MAY 22, 1991

THANK YOU, MR. CHAIRMAN.

WITH THE MARKUP OF THIS EPA AUTHORIZATION BILL, OF WHICH I AM PLEASED TO BE A CO-SPONSOR, THE SCIENCE COMMITTEE WILL COMPLETE THE MARKUP PHASE OF ALL AGENCY AUTHORIZATION BILLS UNDER ITS JURISDICTION FOR FY '92. PERHAPS OF EVEN GREATER DISTINCTION, WITH THIS FINAL ACTION, THE TOTAL AMOUNT AUTHORIZED BY THIS COMMITTEE FOR ALL OF ITS BILLS WILL BE WITHIN THE PRESIDENT'S BUDGET REQUEST.

ESPECIALLY WHEN COMPARED TO PREVIOUS YEARS, THIS IS QUITE AN ACCOMPLISHMENT, AND I WOULD LIKE TO CONGRATULATE THE CHAIRMAN FOR HIS LEADERSHIP IN MAKING IT HAPPEN.

MR. CHAIRMAN, AS A COSPONSOR, I SUPPORT THE COMMITTEE REPORTING H.R. 2404, WITH CERTAIN AMENDMENTS, AS RECOMMENDED BY THE SUBCOMMITTEE RESPONSIBLE FOR THIS BILL. MR. SCHEUER, THE SUBCOMMITTEE CHAIRMAN, AND MR. RITTER, THE REPUBLICAN CHAIRMAN, ARE TO BE COMMENDED FOR PRODUCING AN EXCELLENT BILL.

WITH THE AMENDMENTS ANTICIPATED, H.R. 2404 SATISFIES THE PRESIDENT'S REQUEST AND ADDS $24.5 MILLION, DISTRIBUTED AMONG FIVE AREAS OF STRONG INTEREST TO THIS COMMITTEE. THEY ARE:

1. POLLUTION PREVENTION/SOURCE REDUCTION

2. INDOOR AIR POLLUTION

3. ELECTROMAGNETIC FIELDS (EMF)

4. LABORATORY INSTRUMENTATION

5. EXTRAMURAL GRANTS

THIS PROVIDES THE CONGRESS WITH A BILL THAT IS FISCALLY CREDIBLE, ONE WHICH THE APPROPRIATORS CAN FULFILL, AND ONE THAT RESPONSIBLY REFLECTS THE PRIORITIES OF THIS COMMITTEE. IT REPRESENTS A FITTING CONCLUSION TO WHAT HAS BEEN AN OUTSTANDING MARKUP PERFORMANCE BY THIS COMMITTEE IN FY '92.

THANK YOU, MR. CHAIRMAN.

The **Chairman**. At this point, we're merely seeking discussion of the committee report before we vote to adopt it.

Does the gentleman from Ohio wish to——

Mr. **Traficant**. Mr. Chairman, I want to also commend everyone concerned and the staff, too. I think members are more informed, and I think the staff deserves some credit and our leaders deserve credit for having the staff ensure that.

But there are two issues I want to talk about. There are certain microorganisms that have been known to destroy sulfur in coal and petroleum- based products, and they're like little Pac-Men that go out there and feed on these things, and I was going to offer an amendment to enhance that technology and research, but I've decided at the counsel of the committee not to do that to try and keep us within the budget situation that Mr. Walker alluded to, and I agree with him on that.

So I didn't, but I would just like to say to this committee that they have now come up with a couple of those technologies. The problem in the past has been there weren't enough Pac-Men that they could produce to really have an impact on any major oil spill or to really do anything with coal. Now they're coming up with the technologies to produce enough of them where they can start making that impact, and in the future, if I am here, I plan to try and get some money not just for the research, but for some practical demonstration of eastern oil shale, recovering oil from shale rock, removing the sulfur from coal, and having a bioremediation program that can actually deal with petroleum- and oil-based spills.

So I just want to offer that. I didn't offer anything along those lines this time, because the committee didn't want to because of the money, but I think it's something that we as a committee should be addressing.

Mr. **Walker**. Will the gentleman yield?

Mr. **Traficant**. Yes.

Mr. **Walker**. As the gentleman knows, those bioremediation techniques were used in the Alaska oil spill and, in the limited application that they made there, worked very successfully. So, the gentleman is right on target with regard to this being a technology of the future. And, it is something that we as a Committee will want to keep an eye on and keep a hand in as we move forward, because it really does offer real potential for the Nation's environmental future.

Mr. **Barton**. Mr. Chairman.

The **Chairman**. The gentleman from Texas?

Mr. **Barton**. When would it be in order for me to offer my amendment?

The **Chairman**. It will be in just a moment. The Chair will protect the gentleman.

The Chair also wishes to commend the gentleman from Ohio for his interest in the bioremediation area. It is an area of growing importance, and the Chair will be glad to work with the gentleman to make sure that increased resources in the future are made available for these programs.

Any further discussion of the report itself?

[No response.]

The CHAIRMAN. If not, the Chair recognizes the gentleman from Pennsylvania.

Mr. RITTER. Mr. Chairman, I move the adoption of the report of the Subcommittee on Environment on H.R. 2404, the Environmental Research, Development, and Demonstration Authorization Act of 1991.

The CHAIRMAN. Any further discussion?

[No response.]

The CHAIRMAN. If not, the Chair will put the question.

All those in favor of the motion will signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the report is adopted.

The bill is now open for discussion and for amendment at any point.

The Chair will recognize himself first to present an amendment. The amendment that I offer has been discussed with the subcommittee chair and ranking minority members. It restores the $24.5 million cut made by the subcommittee in order to accommodate the additional funding to the five priority research areas which were mentioned by the Chairman, including source reduction, indoor air quality, electromagnetic field research, laboratory instrumentation, and extramural grants. The amendment will send a clear signal that the Science, Space, and Technology Committee believes that a healthy and robust budget for environmental research is essential in protecting both ecological welfare and public health.

The Chair also has an additional amendment, which he asks unanimous consent to present en bloc, which deals with the electromagnetic field problem.

What we're trying to do with this amendment is to establish a coordinated national program, and it will include a $1.5 million program in the EPA. The Department of Energy will make a similar contribution, and the total will be matched by industry. This is based upon consultation with the other departments and with industry, and it seems to be the kind of a program which industry feels will give credibility to this important area of research, which has been getting a great deal of national attention in recent times.

So the Chair would like to offer both of these amendments en bloc, and the Chair will recognize the gentleman from Pennsylvania, Mr. Walker.

[The amendments proposed en bloc by the Chairman follow:]

BROWCA015

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. BROWN

Page 2, line 4, through page 5, line 8, amend section 2 to read as follows:

SEC. 2. GENERAL AUTHORIZATIONS.

(a) ENVIRONMENTAL RESEARCH, DEVELOPMENT, AND DEMONSTRATION.--There are authorized to be appropriated to the Administrator of the Environmental Protection Agency (hereafter in this Act referred to as the ``Administrator'') for environmental research, development, and demonstration activities, the following sums:

(1) $119,585,000 for fiscal year 1992, $139,197,000 for fiscal year 1993, and $162,025,000 for fiscal year 1994, for activities authorized under the Clean Air Act.

(2) $28,902,000 for fiscal year 1992, $33,642,000 for fiscal year 1993, and $39,159,000 for fiscal year 1994 for activities authorized under the Federal Water Pollution Control Act, the Marine Protection, Research, and Sanctuaries Act of 1972, and the Plastics Pollution Research and Control Act of 1987.

(3) $22,241,000 for fiscal year 1992, $25,889,000 for fiscal year 1993, and $30,134,000 for fiscal year 1994 for activities authorized under the Safe Driving Water

Act.

(4) $43,575,500 for fiscal year 1992, $50,722,000 for fiscal year 1993, and $59,040,000 for fiscal year 1994 for activities authorized under the Resource Conservation and Recovery Act of 1976, and the Emergency Planning and Community Right-to-Know Act of 1986.

(5) $14,974,900 for fiscal year 1992, $17,431,000 for fiscal year 1993, and $20,289,000 for fiscal year 1994 for activities authorized under the Federal Insecticide, Fungicide, and Rodenticide Act.

(6) $5,073,000 for fiscal year 1992, $5,905,000 for fiscal year 1993, and $6,873,000 for fiscal year 1994 for activities related to radiation, authorized under section 301 of the Public Health Service Act, the Radon Gas and Indoor Air Quality Act of 1986, and the Indoor Radon Abatement Act of 1988.

(7) $166,886,000 for fiscal year 1992, $194,255,000 for fiscal year 1993, and $226,113,000 for fiscal year 1994 for multimedia activities.

(8) $26,263,000 for fiscal year 1992, $30,567,000 for fiscal year 1993, and $35,580,000 for fiscal year 1994 for activities authorized under the Toxic Substances Control Act and the Asbestos Hazard Emergency Response Act of 1986.

(9) $13,672,200 for fiscal year 1992, $15,914,000 for

fiscal year 1993, and $18,524,000 for fiscal year 1994 for energy activities and activities authorized by the Energy Security Act of 1980.

Nothing in this Act shall affect amounts authorized for fiscal years 1992 and 1993 for Superfund research activities as authorized by the Superfund Amendments and Reauthorization Act of 1986.

(b) PROGRAM MANAGEMENT AND SUPPORT.--There are authorized to be appropriated to the Administrator $5,187,000 for fiscal year 1992, $6,038,000 for fiscal year 1993, and $7,028,000 for fiscal year 1994, for program management and support of the Office of Research and Development.

(c) CLOSING OFFICES AND REDUCTIONS-IN-FORCE.--No funds appropriated pursuant to this Act shall be used by the Administrator to close any field station, regional office, laboratory, or other research center, or for any reduction-in-force, and no such closing or reduction shall be finalized, unless at least 30 days prior to the issuing of any general notice of such closing or reduction the Administrator informs the appropriate legislative and appropriations committees of the House of Representatives and the Senate in writing of the reasons for such closing or reduction, the impact of such closing or reduction on carrying out the provisions of this Act, the details of such reduction or closing, and other pertinent information.

(d) AVAILABILITY.--Appropriations made pursuant to this Act shall remain available for obligation or expenditure for such periods as may be specified in the Acts making such appropriations.

BROWCA016

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. BROWN

Page 13, line 25, insert ``, of which $1,500,000 shall be for a grant to the private sector for the assessment of the effects of exposure to electromagnetic fields, and of which $200,000 shall be for the National Institute of Standards and Technology's research to provide the measurement technology needed to characterize nonionizing electromagnetic fields'' after ``fiscal year 1992''.

Mr. WALKER. Mr. Chairman, I'd just like to indicate that the minority does in fact agree with the Chairman on both his amendments and are pleased to support them.

The CHAIRMAN. The Chair appreciates that very much.

If there is no further debate on the Chair's amendment, he will put the two en bloc.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the amendments are agreed to. The Chair will now recognize the gentleman from Texas, Mr. Barton.

Mr. BARTON. Thank you, Mr. Chairman.

I would like to offer an amendment that is at the desk.

The CHAIRMAN. It's already in a package before the members, Mr. Barton. The Chair recognizes you for five minutes to speak in support of your amendment.

Mr. BARTON. I will simply say that this is an amendment that does not require any additional funding. It does not require the authorization of any technology that has not already been authorized. The remote-sensing testing device that the amendment refers to was adopted under the Clean Air Act Amendments last year that were in the jurisdiction of the Energy and Commerce Committee.

This device quite simply measures the amount of on-road emissions in vehicles as they drive down the highway. It has been extensively tested in California, Colorado, and Illinois. It is required that States that are in non-compliance for ozone non-attainment consider using this device, as part of their State implementation plan to come into compliance. And, this amendment quite simply requires the Environmental Protection Agency to expend a small amount of funds to do the studies necessary to convince some of the bureaucrats in the higher levels of the EPA of the utility of the device.

I'd be happy to yield to the gentleman from Pennsylvania.

[The amendment proposed by Mr. Barton follows:]

AMENDMENT BY MR. BARTON

After Section 16, add Section 17 as follows:

SEC. 17 . RESEARCH AND DEVELOPMENT FOR ON-ROAD REMOTE SENSING TECHNOLOGY

(a) **Establishment of a Research and Develoment Program.**-- Under the Air Quality research activities authorized under Section (2)(a)(1), the administrator shall develop and implement a plan for a research program for on-road motor vehicle emissions monitoring by means of remote sensing technology. Such plan shall include advanced research on unobtrusive means to measure mobile source pollution, including Carbon Monoxide, Hydrocarbons, Aromatic Hydrocarbons, and Nitrogen Oxides. Such plan shall also include research on how best to refine such new and existing technology for utilization in State Implementation Plans (SIP).

(b) **Authorization for Appropriations.**--Of the amounts authorized under (2)(a)(1), there are authorized to be appropriated for carrying out this section $1,000,000 for fiscal year 1992, $1,000,000 for fiscal year 1993, and $2,000,000 for fiscal year 1994.

Mr. RITTER. I want to thank the gentleman for yielding, and I want to thank him for his leadership. As he said—and we both do serve on the Energy and Commerce Committee—these became part and parcel of the Clean Air Act last year.

We would like to see EPA get involved at a more energetic level to deal with this problem of the reality of mobile source emissions, as opposed to the computer model of mobile source emissions. The fact is that gross polluters are out there, and, on certain emissions, you can see them when you follow a bus, or you follow a car. But, the computer model is not picking up the gross polluters.

Now, it is understood that half of the carbon monoxide emitted by vehicles in America is emitted by only 8 percent of the vehicles. These are your gross polluters. These are the kind of vehicles that the Barton amendment's technology and the EPA's efforts would help to locate and get off the road or get cleaned up. The overall vehicular carbon monoxide reduction in this country could be as great as 40 percent overall, and that's, for a very small investment, a very big return.

As the gentleman said, they're working on this in several States. It makes sense for the EPA to do it for the country. We as a Committee should urge the EPA to get on with this job and come up with some support capability, to see to it that this technology gets out there, and we can do a better job of cleaning up America's air.

I yield back to the gentleman and thank him for his leadership.

Mr. BARTON. I yield back to the Chair.

The CHAIRMAN. Does the gentleman from Ohio desire to be recognized?

Mr. TRAFICANT. Mr. Chairman, I support his amendment. I think it's a good amendment. We should be doing that as a committee.

The CHAIRMAN. The Chair would like to make a statement with regard to this.

This is normally the kind of an amendment that the Chair is really quite enthusiastic about, because he's not on new high-technology systems to accomplish things that need to be accomplished, and this fits within that category. The problems that I have with it are basically procedural. As the gentleman has already indicated, this is a matter which really falls within the jurisdiction of the Energy and Commerce Committee, and I know he's aware of that. It does pose the possibility of the Energy and Commerce Committee seeking a sequential referral of the research portions of our bill which are not within his jurisdiction, but this particular matter he might construe to be within his jurisdiction.

Mr. BARTON. Would the Chairman yield on that point?

The CHAIRMAN. I'd be happy to yield to the gentleman.

Mr. BARTON. Mr. Chairman, last year, when the amendment authorizing the device itself was included in the Clean Air Act amendments, it had the full support of the chairman of that Committee, Chairman Dingell. He and his staff are aware of this amendment that I'm offering today and have, to my knowledge, offered no objections about any kind of a jurisdictional dispute.

I cannot speak for the majority staff of the Committee, but, certainly, the minority staff of the Committee has indicated to my staff that there are no jurisdictional problems. So, I would hope that that concern would not lead the Chairman to oppose the amendment.

The **Chairman**. Well, it's not something that I'm going to go into a tizzy over, I can assure the gentleman, but it is a matter of some concern.

The second point is that this did not make the cut in the priorities of research funding that the agency itself brought forward. Now, why that's the case, I don't know. They included an increase of something like $18 million in their request for air research funding, including new technologies, and they didn't put that in that kind of a priority category.

Now, I frequently disagree with their judgment, just as I'm sure the gentleman does, but——

Mr. **Barton**. Would the Chairman yield on that point?

The **Chairman**. Certainly.

Mr. **Barton**. The problem we have with the Environmental Protection Agency on this particular device, Mr. Chairman, number one, is not the cost of it, not the effectiveness of it, and, in this amendment, we're not requiring any additional funding. We are working within the requirements of the Committee print and within the EPA's own suggestions.

The problem at the Environmental Protection Agency is that this device did not come through the normal channel, so to speak. It was developed by a university professor at the University of Colorado at Denver. And, while it has been funded by an EPA research grant coming out of, I believe, Las Vegas, the higher level people in the EPA for some reason don't appear to appreciate the device. And, even though it is now required to be considered for these ozone non-attainment areas in the country, one of the arguments that the high-level EPA officials are using against the device is that it hasn't been studied enough.

So, this amendment is specifically drawn, with a minimal amount of money that's already been authorized, to require that it be studied, because in the areas that it has been studied—Los Angeles, Chicago, Denver, and several other areas around the country—the field test showed without question that this is a very cost-effective way to reduce ozone pollution and to help meet the mandates of the Clean Air Act. When pressed on the issue in public print, in a Business Week article recently, one of the EPA officials said that it was good technology and very promising.

So, I did not offer the amendment at Subcommittee simply because I'm not on the Subcommittee that has jurisdiction. This is my only opportunity. I would hope that the Committee would see fit to include this, and I would be more than willing to work with the Committee Chairman and the Ranking Republican Members of the Committee to make sure that everybody is absolutely satisfied that this is not some sleight-of-hand attempt to sneak something by.

I had the device brought to Washington last year. It was tested on the horseshoe of the Rayburn Building all day long. A number of Members of Congress, including Congressman Ritter, who is no longer here, had their vehicles tested. I had my vehicle tested. In field tests around the country, they've tested well over 100,000 vehicles. There's no question in my mind that if we want to meet the mandates of the Clean Air Act in a cost-effective way, preserve American jobs, prevent American automobile industry from going more into the hole, this is one of the most cost-effective, one of the most efficient things that we could do. And, I would certainly hope that we could include this in this bill.

The **Chairman**. The Chair actually is appreciative of the gentleman's interest and concern in improving the technology for mitigation of air pollution problems.

As this is a matter of history, I got elected to Congress almost 30 years ago, promising to solve the air pollution problems of southern California, and the gentleman may help me to——

Mr. **Barton**. This could help you, Mr. Chairman.

The **Chairman**. Right. [Laughter.]

Mr. **Barton**. In fact, the Los Angeles County District Attorney's Office right now has a draft plan, that I've got with me and I'll be happy to present to you, that wants to use 70 of these devices. We are actively engaged with the EPA here in Washington on behalf of the Los Angeles County District Attorney's Office to get that approved for use.

The **Chairman**. Well, as I indicated earlier, my reservations were due to procedural rather than substantive reasons, and if the gentleman will continue to work with us on any problems that might arise in connection with this, the Chair, not desiring to use his proxies to defeat the gentleman's amendment, will be glad to accept it at this point.

Mr. **Barton**. I appreciate that, Mr. Chairman.

The **Chairman**. The Chair will put the question.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The **Chairman**. Opposed, no.

[No response.]

The **Chairman**. The ayes have it, and the gentleman's amendment is accepted.

Does Mr. Traficant have an amendment?

Mr. **Traficant**. I have the same three amendments offered en bloc.

[The amendments proposed en bloc by Mr. Traficant follow:]

TRAFIC059

AMENDMENT TO THE COMMITTEE PRINT
OFFERED BY MR. TRAFICANT

Page 22, after line 25, insert the following new section:

SEC. 16. BUY AMERICA PROVISIONS.

(a) RESTRICTIONS ON CONTRACT AWARDS.--No contract or subcontract made with funds authorized under this Act may be awarded for the procurement of an article, material, or supply produced or manufactured in a foreign country whose government unfairly maintains in government procurement a significant and persistent pattern or practice of discrimination against United States products or services which results in identifiable harm to United States businesses, as identified by the President pursuant to subsection (g)(1)(A) of section 305 of the Trade Agreements Act of 1979 (19 U.S.C. 2515(g)(1)(A)). Any such determination shall be made in accordance with such section 305.

(b) PROHIBITION AGAINST FRAUDULENT USE OF ``MADE IN AMERICA'' LABELS.--If it has been finally determined by a court or Federal agency that any person intentionally affixed a label bearing a ``Made in America'' inscription, or an inscription with the same meaning, to any product sold in or shipped to the United States that is not made in the United States, that person shall be ineligible to receive any contract or subcontract from the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, pursuant to the debarment, suspension, and ineligibility procedures in subpart 9.4 of chapter 1 of title 48, Code of Federal Regulations.

(c) BUY AMERICAN REQUIREMENT.--(1) The Administrator is authorized to award to a domestic firm a contract for the purchase of goods that, under the use of competitive procedures, would be awarded to a foreign firm, if--

(A) the final product of the domestic firm will be completely assembled in the United States;

(B) when completely assembled, more than 50 percent of the final product of the domestic firm will be domestically produced; and

(C) the difference between the bids submitted by the foreign and domestic firms is not more than 6 percent.

(2) This subsection shall not apply to the extent to which--

(A) in the opinion of the Administrator, after taking into consideration international obligations and trade relations, such applicability would not be in the public interest;

(B) in the opinion of the Administrator, after consultation with the Secretary of Defense, compelling national security considerations require otherwise; or

(C) the President determines that such an award would be in violation of the General Agreement on Tariffs and Trade or an international agreement to which the United States is a party.

(3) This subsection shall apply only to contracts made for which--

(A) amounts are authorized by this Act to be made available; and

(B) solicitations for bids are issued after the date of enactment of this Act.

(4) The Administrator, before January 1, 1993, shall report to the Congress on contracts covered under this subsection--

(A) entered into with foreign firms pursuant to a determination made under paragraph (2) of this subsection; and

(B) awarded to domestic firms pursuant to paragraph (1) of this subsection, in fiscal years 1991 and 1992.

(5) For the purposes of this subsection--

(A) the term ``domestic firm'' means a business entity that is incorporated in the United States and that conducts business operations in the United States; and

(B) the term ``foreign firm'' means a business entity not described in subparagraph (A).

The CHAIRMAN. The same amendments?

Mr. TRAFICANT. The same Buy American amendments.

The CHAIRMAN. The Chair is willing to accept the gentleman's amendment with his assurance that it's the same as before, and without further debate, the Chair will put the question.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the amendment is agreed to.

Are there any proposed additions or changes in the committee views or report language?

[No response.]

The CHAIRMAN. If not, the Chair is ready to entertain a motion and recognizes Mr. Walker for that purpose.

Mr. WALKER. Mr. Chairman, I move that the Committee report the bill H.R. 2404, as amended, and instruct the staff to prepare the legislative report and to make technical and conforming amendments, and that the Chairman take all necessary steps to bring the bill before the House for consideration.

The CHAIRMAN. Any discussion?

[No response.]

The CHAIRMAN. If not, the Chair will put the question.

All those in favor, signify by saying aye.

[Chorus of ayes.]

The CHAIRMAN. Opposed, no.

[No response.]

The CHAIRMAN. The ayes have it, and the bill is reported.

The Chair thanks the committee members for their diligence, and I will not restate the importance of our action here, but it is significant and will be noted.

With no further business to come before the committee, we stand adjourned.

[Whereupon, at 12:27 p.m., the committee adjourned, to reconvene at the call of the Chair.]

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